

The ichneumon-fly genus *Banchus* (Hymenoptera) in the Old World

M. G. Fitton

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

This paper provides the first comprehensive account of the genus *Banchus* (Ichneumonidae, Banchinae) in the Old World. Twenty-three species are recognized, described and keyed. Seven of the species are new. Geographical distributions and data on biology and hosts are summarized. Known hosts are Lepidoptera (mainly of the family Noctuidae) and *Banchus* species are known to play an important role in the control of some pest species in Europe and North America. The taxonomic treatment includes 11 new synonymies, one provisional synonymy, three new combinations, one revised combination, two revised statuses, three lectotype designations and four nomina dubia.

Introduction

Banchus has had a chequered history. Taxonomists found it difficult to assign to one of the five traditional subfamilies of the Ichneumonidae, sometimes placing it in the Ophioninae and sometimes in the Pimplinae. As originally defined by Fabricius (1798; 1804) the genus included members of the families Braconidae, Cephidae, Pompilidae, Proctotrupidae and Ibalidae, as well as the Ichneumonidae. This exotic assortment was reduced by Gravenhorst (1829) to a grouping resembling the genus as understood at present. The main error in his treatment was the transposition of the sexes. Developments in the following 150 years were mainly concerned with description of new species, splitting the genus and faunistic studies. Much of this work was of poor quality; no one made a comprehensive study and those describing and keying species failed to appreciate all but the most superficial characters. A real advance in our understanding of the taxonomy of *Banchus* came only with publication of the revision of the Nearctic species by Townes & Townes in 1978.



Fig. 1 *Banchus palpatis*, male, habitus.

***BANCHUS* Fabricius**

Banchus Fabricius, 1798: 209, 233. Type-species: *Banchus pictus* Fabricius, by subsequent designation (Curtis, 1836: 588).

Corynephanus Wesmael, 1849: 631. Type-species: *Banchus monileatus* Gravenhorst, by monotypy.

Cidaphurus Foerster, 1869: 159. Type-species: *Ichneumon volutatorius* Linnaeus, by subsequent monotypy (Woldstedt, 1877: 439).

Nawaia Ashmead, 1906: 184. Type-species: *Nawaia japonica* Ashmead, by monotypy.

DIAGNOSIS. Moderately-built ichneumonids (Fig. 1), fore wing length 7.7–14.3 mm. Frons simple. Margin of clypeus with a median notch. Genal carina joining hypostomal carina above base of mandible. Upper tooth of mandible much wider than lower tooth and longer, its apex truncate and weakly subdivided. Lower tooth pointed. Maxillary palp with segment 4 more or less widened and flattened distally, especially in males. Labium not elongate. Antennal flagellum long, tapered to a slender apex. In males, flagellum with poorly- to well-developed specialized setae (flag setae), 2 to 4 per segment, often arising from a poorly- to well-marked, shallow trough on the dorsal surface. Epicnemial carina absent. Scutellum produced posteriorly into a spine, although it is sometimes reduced to a very weak tubercle or even absent. Propodeum short, its posterior transverse carina strong laterally, weak or obsolete medially. Pleural carina present, at least in part. Tarsal claws pectinate. Laterotergites of segments 2 and 3 of gaster about 0.7 times as deep as long. Gaster more or less compressed, relatively strongly so in most females. Ovipositor very short, its sheath about 0.1 times as long as hind tibia.

REMARKS. The genus comprises 47 valid, described species. One is Holarctic in distribution, a further 24 occur in the Nearctic (Townes & Townes, 1978) and another 22 are found in the Palaearctic and the mountains of the Oriental region.

Banchus is the largest of a group of five genera united by the structure of the mandible. The mandible is of an unusual, almost tridentate form unlikely to have arisen more than once within the Banchinae. A mandible similar in structure is found only in the Diplazontinae (in which subfamily it occurs in all species). The other genera in the *Banchus*-group are: *Rhynchobanchus* (with 3, possibly 4, Palaearctic species); *Banchopsis* (1 Palaearctic and 1 Oriental species); *Ceratogastra* (1 Palaearctic and 1 Nearctic species) and; *Philogalleria* (7 Australian species and 1 species in Argentina which possibly deserves a separate genus). Within this group the most important discriminant characters are the form of the claws, the presence or absence of the epicnemial carina, the extent of the propodeal carinae, the form of the frons, the position of cross-vein 2m-cu in the fore wing, and the relative sizes of the coxae.

The tribe Banchini, as currently recognized (Townes, 1970: 45; Townes & Townes, 1978: 378), includes two disparate elements – the *Banchus*-group of genera and *Exetastes* and its allies. Cushman (1937), Perkins (*in* Beirne, 1941) and Beirne (1941) all supported separation of the two groups on the basis of adult and larval characters. Cushman and Perkins associated the *Exetastes*-group more closely with the tribe Lissonotini. Townes (1944) on the other hand linked the two groups as the Banchini, separate from the Lissonotini, mainly on the basis of a rather weak character in the hind wing venation. Townes has consistently maintained this position. Viktorov (1967) supported Cushman's (1937) conclusion, citing several characters of *Exetastes* which distinguish it from the *Banchus*-group. Aubert (1978) has gone further, placing *Exetastes* in a tribe of its own, Exetastini. As with many ichneumonid subfamilies the generic and tribal classification of the Banchinae, although workable, is in need of closer study. Townes' (1970) treatment and key fail to take account of the structure of the mandible in *Philogalleria* (of which Townes may have then seen only one specimen).

Taxonomy

Despite its long period of gestation this study, based on the examination of 3421 specimens of Old World *Banchus*, cannot be regarded as definitive. It has raised as many taxonomic questions as it has answered. The lack of specimens from some problem areas (taxonomic as well as geographic), coupled with an inadequate knowledge of most aspects of the biology of the genus, has effectively prevented discrimination of all of the species. A conservative approach was adopted and some of the morphospecies recognized undoubtedly comprise complexes of two or

more 'biological' species. With the material and resources available further splitting could not be justified on scientific grounds.

Apart from obvious species-pairs or very small groups it is difficult to deduce anything of the phylogenetic relationships of the species within the genus. As noted by Townes & Townes (1978) in their revision of North American *Banchus*, the characters which distinguish species do not correlate in ways which indicate clear-cut species-groups. Specialization by reduction (an obvious example is in the length of the scutellar spine) is probably one of the complicating factors. The best that can be done is to suggest trends of specialization for individual characters.

Many species show considerable sexual dimorphism (including colour patterns). The most obvious morphological differences are in the shape of the gaster, the antennae and the maxillary palps. The specializations in the female seem to be associated with oviposition and in the male with mate-finding and courtship. In some species the overall colour pattern is the same in male and female, in others it is completely different, for example, in *B. falcatorius* and *B. volutatorius* the females are largely black with reddish legs while the males are conspicuously marked with yellow. This female colour pattern, although still aposematic, probably renders her less conspicuous while searching for hosts (which, in *B. falcatorius*, probably occurs very low in the vegetation at soil level). As a general rule males have a yellowish face with a median black stripe and females a black face, sometimes with yellowish orbital marks, and there are often also differences in the colour of the antennae.

The characters which have been used in this study are discussed below. The formal descriptions of species in the systematic section of the paper are restricted largely to the characters used in the keys. When comparing specimens with figures allowance should be made for some variation.

Head. The overall shape of the head is important in distinguishing species. The characters most easily used are the relative width of the face and the size of the malar space. These are measured as indicated in Figs 2 and 3. The shape of the head behind the eyes varies between species but is much more difficult to use as a distinguishing character. The maxillary palps are specialized in many species (Figs 11–32, 103–123). The relative lengths of the two terminal segments are important and in males the way in which the fourth segment is widened and flattened is characteristic. The antennae vary in length and in the shape of the terminal segments, both characters being difficult to use in keys.

In the male the distal half of the antenna bears specialized setae ('flag setae') on its dorsal surface (Figs 124–129). The development of these varies greatly between species. In the most primitive cases the setae are not easily distinguished from others on the antenna. In the most specialized forms the setae (two, three or four per segment) are erect, widened and flattened and arise from a shallow polished trough. All segments do not bear these setae, there is a zone (which varies in position between species) in which they are best developed and proximally and distally to this the setae become progressively less modified. The descriptions given for each species apply only to the zone bearing the most modified setae. The shape and number per segment are subject to some variation, but together with the form of the male maxillary palps these setae give the best 'key' characters for a species. Both are probably important in courtship.

Thorax and propodeum. The scutellum bears a spine on its posterior apex (Figs 33–58). The primitive condition, it is supposed, is to have a well-developed spine. The length of the spine is impossible to measure accurately because of the lack of reference points, and there is variation within species. Nonetheless it is still useful taxonomically. The lower postero-lateral corners of the mesothorax in some species are formed into weak tubercles which, although relatively constant in their development, are difficult to use comparatively. In the descriptions the 'posterior part of the propodeum' refers to the posterior transverse carina and the area behind and enclosed by it. The posterior transverse carina itself is often obsolete or absent medially.

The measured proportions of the hind femur (as shown in Fig. 5) are used to represent the general proportions of the legs as a whole. The length of the fore wing (measured from the tip of the tegula to the tip of the wing) is used as a measure of overall size.

Gaster. The form of the gaster in the female offers a number of very useful characters. However, their practical value is much reduced by the very variable amounts of distortion found

in dry specimens. Allowance must be made for this in comparing specimens with descriptions and figures, particularly those of the apex of the gaster (Figs 82–102). The distortion most affects the amount of compression of the posterior half of the gaster, the telescoping of segments and the compression and profile of sternite 6 (the subgenital plate) which in some species has a weaker, less sclerotised portion on its posterior margin. The form of tergite 1 is not subject to distortion and it offers useful characters in males and females (Figs 59–81), although subject to some variation (compare Figs 65 and 66 of male and female *gudrunae*). The proportions of tergite 1 are measured as indicated in Fig. 4.

Sculpture and colour. The development of microsculpture and puncturation on the thorax, coxae and gaster varies between species but variation within species and difficulties of description limit its value. Colour patterns are subject to variation but are easily observed. Care was taken to ensure that such variation was taken into account in construction of those parts of the keys relying on colour.

Biology and hosts

Townes & Townes (1978) state that *Banchus* is a genus of open shrubby country and that females fly rather low and males higher and faster. However, there are few published observations on the habits and habitats of individual species. Adults have been collected from flowers. The black and yellow and/or reddish colour patterns may be aposematic (Townes & Townes note that specimens give off a strong pungent odour when captured). *B. falcatorius* has been recorded as the prey of an asilid fly.

Most species probably are univoltine and adults are on the wing for some period during late spring or early summer. A few species (e.g. *B. dilatatorius*) occur in early spring. These probably pass the winter as adults or pharate adults within the cocoon. In Europe three species (*B. zonatus*, *B. gudrunae* and *B. moppiti*) have been taken in late autumn, winter and early spring. Of these three, *B. zonatus* and *B. gudrunae* are Mediterranean in distribution whilst the few known specimens of *B. moppiti* come from localities as scattered as Great Britain, Switzerland and Spain. There appears to be a similar pattern in the species in the eastern Palaearctic and mountains of the Oriental region, with some specimens of the more southern species occurring in the period from October to May. However, some of these species might not be univoltine.

Courtship behaviour in *B. hastator* is described by van Veen (1982): when the male encounters a female he orientates himself face to face and starts fanning with his wings, probably creating an airstream along the female and himself. The gaster of the male is also raised and at intervals these actions are interrupted by an attempt to mount the female. Using the tips of the antennae the male gently strokes the legs and sides of the thorax of the female. If the female is receptive copulation takes place.

The hosts of *Banchus* are Lepidoptera. All of the reliable observations relate to species of Noctuidae, though species of seven other lepidopterous families are also recorded. Whether or not any or all of the non-noctuid records should be rejected is difficult to assess. In the Nearctic species *B. flavescens* it has been shown that females oviposited readily in the larvae of its usual host *Mamestra configurata* Walker and also in *Scotogramma trifolii* (Rottemburg) and *Trichoplusia ni* (Hübner), but had to be induced to attack *Autographa californica* (Speyer), *A. falcifera* (Kirby) and *Heliothis ononis* (Denis & Schiffermüller) by an immediately preceding exposure to *M. configurata* larvae (Arthur & Ewen, 1975; Ewen & Arthur, 1976). All these hosts are noctuids and in addition to the reluctance of the females to oviposit in some species the parasite failed to develop in any except *M. configurata*, because of successful host defence reactions. Van Veen (1982), working with *B. hastator* in the Netherlands, found 'that an antennal contact of a few strokes with the cuticle of the host's skin was sufficient to reject a strange host by walking away or to a susceptible instar of *P[anolis] flammea* [the usual host] immediately by an acute sting reaction'. He unfortunately does not identify the 'strange host'. All these results could be used to support a contention that *Banchus* species are probably monophagous on species of Noctuidae, but for one species, *B. volutatorius*, there are reliable rearings from at least three noctuid species (*Anarta myrtilli* (Linnaeus), *Lacanobia oleracea* (Linnaeus) and *Xestia xanth-*

ographa (Denis & Schiffermüller)), so judgement must be reserved. The host records from two Hymenoptera (Maneval, 1935) can probably be dismissed out of hand.

The larvae normally develop as solitary internal parasites and it is usually suggested that oviposition is into an early instar host larva. In experiments, van Veen (1982) has demonstrated a preference for early instar larvae in *B. hastator*, although females will attack all larval instars except the last (the fifth) (van Veen, 1982; Błedowski & Kraińska, 1926). The larval development of *B. hastator* was studied in detail by Błedowski & Kraińska (1926). The head sclerites of the final larval instar of four species are illustrated by Short (1978). Short's work should be used with caution: his figures of *Banchus* show why. The illustrations of *B. femoralis* and *B. hastator* show differences which might be thought significant; however, both specimens are of the same species (*B. hastator*, of which *femoralis* is a synonym) and one figure shows the view from outside the head capsule while the other shows the view from within! Other figures are given by Beirne (1941) and Barron (1976).

The full-grown *Banchus* larva kills and leaves the host larva after it has left its foodplant and entered the soil to pupate (this has been reported in several species). Cocoons of *Banchus* are elongate-ovoid, the silk dense and almost black. The adult emerges through a hole cut next to one end.

Barron (1976) records a species of *Banchus* (from Maryland) parasitized by *Euceros medialis* Cresson (Hymenoptera: Ichneumonidae).

Systematic list of hosts

The list below includes all the hosts of *Banchus* detailed elsewhere in this paper. Those details can be accessed via the index.

LEPIDOPTERA

ZYGAENIDAE

Zygaena ephialtes (Linnaeus)

NYPHALIDAE

Melitaea didyma (Esper)

THYATIRIDAE

Achlya flavicornis (Linnaeus)

Habrosyne pyritoides (Hufnagel)

GEOMETRIDAE

Opisthograptis luteolata (Linnaeus)

SPHINGIDAE

Deilephila elpenor (Linnaeus)

Deilephila porcellus (Linnaeus)

Hyloicus pinastri (Linnaeus)

Smerinthus ocellata (Linnaeus)

NOTODONTIDAE

Phalera bucephala (Linnaeus)

LYMANTRIIDAE

Dasychira fascelina (Linnaeus)

Euproctis similis (Fuessly)

Leucoma salicis (Linnaeus)

NOCTUIDAE

Acronicta megacephala (Denis & Schiffermüller)

Agrochola circellaris (Hufnagel)

Agrochola helvola (Linnaeus)

Agrotis exclamationis (Linnaeus)

Agrotis segetum (Denis & Schiffermüller)

Anarta myrtilli (Linnaeus)

Aporophyla lutulenta (Denis & Schiffermüller)

Aporophyla lutulenta luenebergensis (Freyer)

Atethmia ambusta (Denis & Schiffermüller)

Bena prasinana (Linnaeus)

Blepharita adusta (Esper)

Ceramica pisi (Linnaeus)
Euxoa nigricans (Linnaeus)
Hadena compta (Denis & Schiffermüller)
Hadena rivularis (Fabricius)
Heliothis viriplaca (Hufnagel)
Lacanobia contigua (Denis & Schiffermüller)
Lacanobia oleracea (Linnaeus)
Lacanobia suasa (Denis & Schiffermüller)
Lycophotia porphyrea (Denis & Schiffermüller)
Mamestra brassicae (Linnaeus)
Panolis flammea (Denis & Schiffermüller)
Phlogophora meticulosa (Linnaeus)
Xestia xanthographa (Denis & Schiffermüller)

HYMENOPTERA**DIPRIONIDAE**

Diprion pini (Linnaeus)

ICHNEUMONIDAE

Ophion luteus (Linnaeus)

Nomenclatural summary***agathae* sp. n.**

altaiensis Meyer, 1927 (nomen dubium)

cerinus Chandra & Gupta, 1977

crefeldensis Ulbricht, 1916

croaticus Hensch, 1928

dilatatorius (Thunberg, 1822) **stat. rev.**

acuminator (Fabricius, 1787) (homonym) **syn. n.**

compressus (Fabricius, 1787) (homonym)

sibiricus Meyer, 1927 **syn. n.**

falcatorius (Fabricius, 1775)

variegator (Fabricius, 1775)

intersectus (Geoffroy, 1785)

aries (Christ, 1791)

labiatus (Schrank, 1802)

histrion (Schrank, 1802) (homonym)

tricolor (Schrank, 1802)

falcator Fabricius, 1804

sachalinensis (Matsumura, 1911)

luteofasciatus Ulbricht, 1911

nobilitator Morley, 1915

sanguinator Meyer, 1922

lavrovi Meyer, 1927

nigromarginatus Constantineanu & Pisciă, 1960

propitius Kuslitzky, 1979 (provisional synonymy)

flavomaculatus (Cameron, 1904)

***gudrunae* sp. n.**

hastator (Fabricius, 1793)

pungitor (Thunberg, 1822)

reticulator (Thunberg, 1822) **syn. n.**

femoralis Thomson, 1897

kolosovi Meyer, 1925 **syn. n.**

insulanus Roman, 1937

japonicus (Ashmead, 1906)

***mauricettae* sp. n.**

***moppiti* sp. n.**

nox Morley, 1913

palpalis Ruthe, 1859 **stat. rev.**

spinus Cresson, 1865 **syn. n.**

formidabilis Provancher, 1874 **syn. n.**
groenlandicus Aurivillius, 1890 **syn. n.**
alticola (Ashmead, 1901) **syn. n.**

pictus Fabricius, 1798

cultratus (Gmelin, 1790) (homonym)
mutillatus (Christ, 1791) (homonym)
zagoriensis Hensch, 1928
bipunctatus Hensch, 1928
russiator Aubert, 1981 **syn. n.**

poppiti sp. n.

punkettai sp. n.

sanjozanus Uchida, 1929

tholus sp. n.

tumidus Chandra & Gupta, 1977

turcator Aubert, 1981

volutatorius (Linnaeus, 1758)

venator (Linnaeus, 1758)
umbellatarum (Schrank, 1786) **syn. n.**
certator (Thunberg, 1822) (homonym)
monileatus Gravenhorst, 1829 **syn. n.**
farrani Curtis, 1836
calcaratus Szépligeti, 1910
alticola Schmiedeknecht, 1910 (homonym)
obscurus Meyer, 1926

zonatus Rudow, 1883

algericus Schmiedeknecht, 1910 **syn. n.**

Species excluded from *Banchus*

Andricus villosulus (Gravenhorst) (nomen dubium) **comb. n.**

Banchus robustus Rudow, 1883 (nomen dubium)

Cephus pygmeus (Linnaeus, 1767)

spinipes (Panzer, 1800)

viridator (Fabricius, 1804)

Earinus elator (Fabricius, 1804) **comb. n.**

Exetastes fornicator (Fabricius, 1781)

Exetastes tomentosus (Gravenhorst, 1829)

Ibalia leucospoides (Hochenwarth, 1785)

cultellator (Fabricius, 1793)

Ichneumon vigilatorius Panzer, 1804 (nomen dubium) **comb. rev.**

Lissonota histrio (Fabricius, 1798)

Megarhyssa quadrator (Schellenberg, 1802) **comb. n.**

Phytodietus armillatus (Morley, 1913)

Pompilus (Episyron) annulatus (Fabricius, 1793)

Proctotrupes gravidator (Linnaeus, 1758)

Theronia atalantae (Poda, 1761)

varius (Fabricius, 1793)

Format, material examined and depositories

In the systematic section the species are arranged in alphabetical order. For each (except *altaiensis*) information is under the following headings.

Synonymy. When types have not been available for study (because of loss or destruction or because they could not be obtained on loan) the inclusion of a nominal species in a synonymy is based on consideration of the original description and/or it is substantiated by reference to a published treatment or is considered more fully under 'Nomenclature'.

Nomenclature. This includes discussion of synonymies, type-restrictions, etc. It takes up a considerable amount of space (and it took up a lot of time) because the nomenclatural problems

associated with work on European species are related to human historical and sociological factors rather than biological ones.

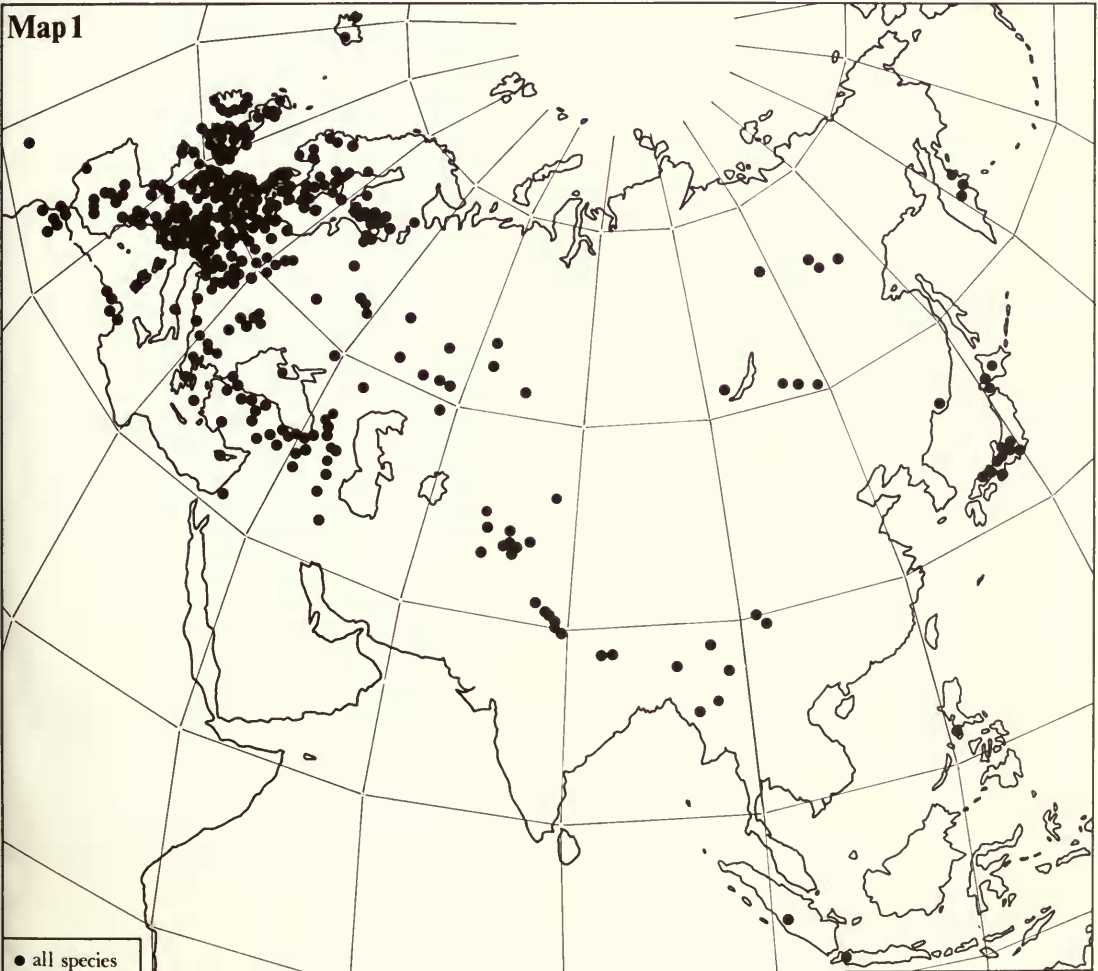
Description. The descriptions for females and males are separate. The characters included are mainly those used in the keys, the ones which apply equally to both sexes are given for the female only (except where the female is not known). The characters, including details of measurements, are discussed in the 'Taxonomy' section above.

Remarks. These include brief notes on recognition and relationships of the species and discussion of its taxonomy.

Biology and hosts. This is a brief summary based on data associated with material examined and information gleaned from the literature. Names of hosts have been up-dated to conform with current usage.

Distribution. As given this is based entirely on data taken from specimens examined, as are the distribution maps. Map 1 shows the distribution of the genus (that is, the combined distributions of all the species) in the Old World for comparison with the distributions of individual species (Maps 2–11). The records in the literature are not reliable and only a few references are made to them (Aubert (1978) should be consulted for more details of these).

Material examined. Except for new species and those known from only a few specimens, the data under 'material examined' are restricted to totals of specimens, the names of countries (and



Map 1 Distribution of *Banchus* in the Old World.

larger islands) from which they come and the depositories in which they are to be found. All specimens on which this revision is based bear my determination labels. Some detail of collecting localities is presented in the distribution maps for each species. However, a feature of much European material is inadequate locality data on labels and there are no points on the maps for perhaps a third of all the specimens examined. Dates of collection are also often lacking; for instance, in an attempt to relate morphological to seasonal variation in *Banchus pictus* only 90 of the 184 specimens to hand could be utilized because the rest had no date of collection.

The names of depositories are abbreviated as in the list below.

AC	Collection of J. Aubert, Paris, France
ANS	Academy of Natural Sciences, Philadelphia, U.S.A.
BC	Collection of R. Bauer, Grossschwarzenlohe, B.R.D.
BMNH	British Museum (Natural History)
BRI	Biosystematics Research Institute, Ottawa, Canada
CM	Castle Museum, Norwich, England
EIHU	Entomological Institute, Hokkaido University, Sapporo, Japan
FSA	Faculté des Sciences Agronomique de l'État, Gembloux, Belgium
GC	Collection of V. Gupta, University of Florida, Gainesville, U.S.A.
HC	Collection of R. Hinz, Einbeck, B.R.D.
IBMPP	All-Union Institute of Biological Methods of Plant Protection, Kishinev, U.S.S.R.
IEAU	Istituto di Entomologia Agraria dell'Università, Sassari, Italy
IEE	Instituto Espanol de Entomología, Madrid, Spain
IEUB	Istituto di Entomologia, Università degli studi di Bologna, Bologna, Italy
IP	Institut für Pflanzenschutzforschung, Eberswalde, D.D.R.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
ITZ	Institut voor Taxonomische Zoölogie, Zoölogisch Museum, Amsterdam, Netherlands
IZPAN	Instytut Zoologiczny, Polska Akademia Nauk, Warsaw, Poland
JC	Collection of R. Jussila, Paattinen, Finland
JKC	Collection of J. Kolarov, Sadovo, Bulgaria
JPM	Jena Phyletisches Museum, Jena, D.D.R.
KC	Collection of K. Kusigemati, Kagoshima, Japan
KHC	Collection of K. Horstmann, Würzburg, B.R.D.
LELW	Laboratorium voor Entomologie van de Landbouwhogeschool, Wageningen, Netherlands
LSL	Linnean Society, London, England
MCSN	Museo Civico di Storia Naturale, Genoa, Italy
MHN	Museum d'Histoire Naturelle, Geneva, Switzerland
MIZS	Museo ed Istituto di Zoologia Sistemica, Turin, Italy
MLSU	Zoological Museum, Moscow Lomonosov State University, Moscow, U.S.S.R.
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, D.D.R.
MUM	Manchester University Museum, Manchester, England
NC	Collection of A. Nakanishi, Fukuoka, Japan
NM	Naturhistorisches Museum, Vienna, Austria
NMB	Naturhistorisches Museum, Basle, Switzerland
NMV	National Museum of Victoria, Melbourne, Australia
NR	Naturhistoriska Riksmuseet, Stockholm, Sweden
PC	Collection of C. Pisciă, Iasi, Rumania
RNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
RSM	Royal Scottish Museum, Edinburgh, Scotland
SC	Collection of H. Schnee, Markkleeberg, D.D.R.
SMT	Staatliches Museum für Tierkunde, Dresden, D.D.R.
TAU	Department of Zoology, Tel-Aviv University, Tel-Aviv, Israel
TC	Collection of H. & M. Townes, American Entomological Institute, Ann Arbor, U.S.A.
TM	Természettudományi Múzeum, Budapest, Hungary
UL	Université Laval, Quebec, Canada
UM	University Museum, Oxford, England
USNM	U.S. National Museum of Natural History, Washington, U.S.A.
UU	Department of Entomology, University of Uppsala, Uppsala, Sweden
UZI	Universitetets Zoologiska Institutionen, Lund, Sweden

UZM	Universitetets Zoologisk Museum, Copenhagen, Denmark
VRC	Collection of G. van Rossem, Ede, Netherlands
ZC	Collection of K. Zwart, Wageningen, Netherlands
ZI	Zoological Institute, Wrocław, Poland
ZIL	Zoological Institute, Leningrad, U.S.S.R.
ZIM	Zoological Institute and Museum, Sofia, Bulgaria
ZMU	Zoological Museum of the University, Helsinki, Finland
ZPZ	Zavod Za Poljoprivednu Zoologiju, Zagreb, Yugoslavia
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich, B.R.D.

Keys to species

The keys to females and males are separate. Sexing specimens of *Banchus* is not always straightforward. The short, broad ovipositor sheaths are sometimes mistaken for the male genitalia. The most reliable way to sex specimens is to examine the last visible tergites and sternites of the gaster: in females they are relatively long (Figs 6–10) and in males they are short (Fig. 1).

Males (the males of *cerinus* and *insulanus* are unknown)

- | | | |
|----|--|---|
| 1 | Maxillary palp (Figs 104, 114) with segment 5 less than 0·2 as long as segment 4; segment 4 long and cylindrical, with only its extreme apex sharply expanded and flattened | 2 |
| – | Maxillary palp (Figs 103, 105–113, 115–123) with segment 5 more than 0·4 as long as segment 4; segment 4 gradually and evenly widened and flattened from base to apex or more sharply expanded from near base | 3 |
| 2 | Hind femur less than 6·2 times as long as deep; entirely reddish yellow in colour. Gaster usually entirely black, the segments sometimes brownish or yellowish on their posterior margins, very rarely as conspicuous yellow bands on tergites 1, 2 and 3. Scutellar spine usually long (more than 0·8 as long as scutellum) (Fig. 47) | <i>palpalis</i> Ruthe (p. 30) |
| – | Hind femur more than 6·5 times as long as deep; black, yellow proximally and distally and sometimes dorsally. Gaster with each segment black anteriorly and yellow posteriorly. Scutellar spine short (about 0·3 as long as scutellum) (Fig. 34) | <i>crefeldensis</i> Ulbricht (p. 15) |
| 3 | Antennal flag setae well developed (Figs 126–129): upright, flattened, 2 or 3 (rarely 4) per segment, arising from a more or less well-defined and polished trough | 4 |
| – | Antennal flag setae not or only poorly differentiated (as in Fig. 124, or at most as in Fig. 125 but shorter): at 60 degrees or less to the segment surface, not flattened, 2 per segment, never arising from a trough | 17 |
| 4 | Antennal flag setae 3 (occasionally 4) per segment (Fig. 129) | 5 |
| – | Antennal flag setae 2 per segment (Figs 126–128) (very rarely a few segments with 3 setae) | 7 |
| 5 | Scutellar spine long (about 0·8 as long as scutellum) (Fig. 44) | <i>mauricettae</i> sp. n. (p. 28) |
| – | Scutellar spine short (about 0·3 as long as scutellum) to absent (Figs 33, 37, 38) | 6 |
| 6 | Hind femur less than 5·3 times as long as deep, usually entirely reddish yellow in colour but can be darkened medially. Malar space more than 0·6 times basal width of mandible | <i>falcatorius</i> (Fabricius) (p. 19) |
| – | Hind femur about 6·1 times as long as deep, yellow in colour with the median part black. Malar space about 0·5 times basal width of mandible | <i>agathae</i> sp. n. (p. 14) |
| 7 | Tergite 1 of gaster at least 2·1 times as long as broad | 8 |
| – | Tergite 1 of gaster at most 2·0 times as long as broad | 11 |
| 8 | Hind femur at least 7·0 times as long as deep. Tergite 3 of gaster with a crease separating laterotergite along its whole length | <i>gudrunae</i> sp. n. (p. 23) |
| – | Hind femur less than 6·5 times as long as deep. Tergite 3 of gaster with a crease separating laterotergite on only about its anterior 0·5 | 9 |
| 9 | Meoscutum shining, with only weak microsculpture between punctures. Scutellar spine at most about 0·5 as long as scutellum (Fig. 39) | <i>flavomaculatus</i> (Cameron) (p. 23) |
| – | Mesoscutum not shining, with well-developed microsculpture between punctures. Scutellar spine at least about 0·7 as long as scutellum (Figs 46, 52) | 10 |
| 10 | Hind femur about 6·0 times as long as deep. Antennal flagellum black with underside of segment 1 and distal section reddish yellow. Segments of gaster each black anteriorly and yellow posteriorly, with junction of the two areas reddish | <i>nox</i> Morley (p. 30) |

- Hind femur at most 5.6 times as long as deep. Antennal flagellum reddish, darkened dorsally (especially first few segments and distal third). Segments of gaster each reddish with some blackish anteriorly, especially on tergites 1 and 2 *sanjozanus* Uchida (p. 37)
- 11 Maxillary palp (Figs 110, 116, 122) with segment 5 about 0.5 as long as segment 4 12
- Maxillary palp (Figs 105, 113, 121, 123) with segment 5 more than 0.7 as long as segment 4 14
- 12 Antennal flagellum black ventrally. Hind femur more than 6.2 times as long as deep. Gaster with tergite 1 at most 1.65 times as long as broad; tergite 3 with a crease separating the laterotergite on at least its anterior 0.8 *japonicus* (Ashmead) (p. 26)
- Antennal flagellum yellowish ventrally. Hind femur at most 6.1 times as long as deep. Gaster with tergite 1 at least 1.60 times as long as broad; tergite 3 with a crease separating the laterotergite on its anterior 0.5 or less 13
- 13 Hind femur reddish yellow, usually entirely, rarely darkened ventrally; at most 5.4 times as long as deep. Hind tibia and segment 1 of hind tarsus reddish yellow, the tibia and sometimes the tarsal segment distally blackish *volutatorius* (Linnaeus) (p. 40)
- Hind femur yellow, black-marked ventrally and internally; at least 5.6 times as long as deep. Hind tibia and segment 1 of hind tarsus blackish, the tibia partly reddish yellow ventrally *poppiti* sp. n. (p. 35)
- 14 Malar space at most 0.6 times basal width of mandible. Antennal flagellum with its proximal 0.6 orange *turcator* Aubert (p. 39)
- Malar space more than 0.6 times basal width of mandible. Antennal flagellum with at least its dorsal surface entirely brownish or blackish 15
- 15 Antennal flagellum yellowish ventrally (and posterior margins of gastral tergites 1, 2 and 3 yellow) or, if antennal flagellum is black ventrally, the posterior margins of gastral tergites 1, 2 and 3 yellowish brown or reddish brown. Hind coxa entirely black *dilatatorius* (Thunberg) (p. 17)
- Antennal flagellum blackish ventrally. Posterior margins of gastral tergites 1, 2 and 3 yellow. Hind coxa black, usually with at least a dorsal yellow spot 16
- 16 Tergite 1 of gaster at most 1.6 times as long as broad. Hind femur at most 5.5 times as long as deep. Fore wing length at most 10.0 mm *moppiti* sp. n. (p. 28)
- Tergite 1 of gaster more than 1.6 times as long as broad. Hind femur more than 5.3 times as long as deep. Fore wing length more than 10.5 mm *zonatus* Rudow (p. 41)
- 17 Tergite 1 of gaster with a strong median swelling in front of level of spiracles, the anterior face of swelling at almost 90 degrees to its dorsal surface (Figs 77, 78). Scutellar spine long (at least 0.7 as long as scutellum) (Figs 53, 54) 18
- Tergite 1 of gaster at most weakly swollen at level of spiracles (Figs 64, 73, 75). Scutellar spine moderately long (about 0.6 as long as scutellum) to very small (Figs 41, 49, 51) 19
- 18 Segment 4 of maxillary palp relatively weakly expanded (Fig. 119); uniformly reddish yellow in colour *tholus* sp. n. (p. 37)
- Segment 4 of maxillary palp considerably expanded from the base (Fig. 120); bi-coloured *tumidus* Chandra & Gupta (p. 38)
- 19 Maxillary palp (Fig. 117) with segment 5 about 0.6 as long as segment 4; segment 4 considerably widened and flattened. Hind femur about 6.0 times as long as deep *punkettai* sp. n. (p. 36)
- Maxillary palp (Figs 109, 115) with segment 5 about 0.8 as long as segment 4; segment 4 slightly or moderately widened and flattened. Hind femur less than 5.7 times as long as deep 20
- 20 Posterior part of propodeum entirely black. Hind coxa almost always entirely black. Segments of gaster each black, usually with the posterior margin brownish yellow. Segment 4 of maxillary palp relatively slightly widened (Fig. 109). Antennal flag setae poorly differentiated and very small (Fig. 124) *hastator* (Fabricius) (p. 24)
- Posterior part of propodeum almost always with yellow marks. Hind coxa black, often with a yellow dorsal patch. Segments of gaster each black anteriorly, broadly yellow posteriorly. Segment 4 of maxillary palp relatively more widened (Fig. 115). Antennal flag setae at about 60 degrees to the segment surface, small (as in Fig. 125 but setae shorter) *pictus* Fabricius (p. 33)

Females (the female of *sanjozanus* is not included in the key)

- 1 Maxillary palp (Figs 13, 24) with segment 5 at most about 0.5 as long as segment 4; segment 4 relatively very long and slender 2
- Maxillary palp (Figs 11, 12, 14-23, 25-32) with segment 5 at least 0.7 as long as segment 4; segment 4 variable in proportions, but much less slender 3

- 2 Hind femur less than 6.0 times as long as deep; reddish yellow in colour, sometimes darkened ventrally. Gaster usually entirely black, posterior edges of some segments may be brownish. Scutellar spine long (usually more than 0.8 as long as scutellum) (Fig. 47) *palpalis* Ruthe (p. 30)
- Hind femur more than 6.3 times as long as deep; black and yellow (proximally and distally and sometimes dorsally). Gaster with each segment black anteriorly and yellow posteriorly. Scutellar spine short (about 0.3 as long as scutellum) (Fig. 34) *crefeldensis* Ulbricht (p. 15)
- 3 Posterior part of propodeum entirely black 4
- Posterior part of propodeum with at least some yellow or reddish marks 9
- 4 Malar space at least 0.8 times basal width of mandible. Width of lower face at least 1.1 times vertical length of eye. Hind femur mainly black *dilatatorius* (Thunberg) (p. 17)
- Malar space at most 0.7 times basal width of mandible. Width of lower face at most 1.0 times vertical length of eye. Hind femur entirely reddish yellow or with more or less extensive black areas 5
- 5 Tergite 7 of gaster (Fig. 85) elongate, subacute, its upper surface rounded posteriorly *falcatorius* (Fabricius) (p. 19)
- Tergite 7 of gaster (Figs 88, 89, 95, 101) of normal length, subtruncate, its upper surface not markedly rounded posteriorly 6
- 6 Hind femur more than 6.0 times as long as deep. Tergite 3 of gaster with a crease separating laterotergite along its whole length *insulanus* Roman (p. 26)
- Hind femur at most 5.5 times as long as deep. Tergite 3 of gaster with a crease separating laterotergite on less than its anterior 0.5 7
- 7 Tergite 1 of gaster at least 1.8 times as long as broad. Hind femur entirely reddish yellow *volutatorius* (Linnaeus) (p. 40)
- Tergite 1 of gaster at most 1.7 times as long as broad. Hind femur reddish yellow with more or less extensive black areas 8
- 8 Tergites of gaster each black anteriorly, broadly yellow posteriorly, the boundary between the two areas sharply defined *pictus* Fabricius (p. 33)
- Tergites of gaster each black, grading posteriorly, to a greater or lesser extent, into a brownish and sometimes yellowish marginal area *hastator* (Fabricius) (p. 24)
- 9 Tergite 7 of gaster (Figs 84, 92, 102) relatively elongate, subacute, its upper surface rounded posteriorly AND width of lower face at least 1.0 times vertical length of eye 10
- Tergite 7 of gaster (Figs 6, 82, 86, 87, 90, 91, 93, 95–100) of normal length, subtruncate, its upper surface not markedly rounded posteriorly AND/OR width of lower face at most 0.9 times vertical length of eye 12
- 10 Antennal flagellum yellowish orange in colour, with the base of segment 1 and the distal segments dark *dilatatorius* (Thunberg) (p. 17)
- Antennal flagellum black, brownish distally 11
- 11 Tergite 7 of gaster (Fig. 102) more elongate. Hind femur at least 5.3 times as long as deep. Fore wing length at least 11.0 mm *zonatus* Rudow (p. 41)
- Tergite 7 of gaster (Fig. 92) less elongate. Hind femur at most 5.2 times as long as deep. Fore wing length at most 10.8 mm *moppiti* sp. n. (p. 28)
- 12 Tergite 1 of gaster with a strong median swelling in front of level of spiracles, the anterior face of the swelling at almost 90 degrees to its dorsal surface (Figs 77, 78) *tholus* sp. n. (p. 37) and *tumidus* (Chandra & Gupta) (p. 38)
- (It has proved impossible to separate reliably the females of these two species. See notes under *tumidus*.)
- Tergite 1 of gaster at most weakly swollen in front of level of the spiracles (Figs 6, 59, 63, 65, 66, 68, 69, 71, 73, 74, 75, 79) 13
- 13 Antennal flagellum entirely black. Hind femur largely black (yellow or reddish proximally and distally) or yellow with a black area medially (which extends onto its dorsal surface) 14
- Antennal flagellum reddish, orange, or yellow, at least on its proximal 0.5, or dark dorsally (black or brownish) and paler ventrally (yellow or reddish). If antennal flagellum is dark (blackish or brownish dorsally and dark reddish ventrally) then hind femur reddish with a black ventral mark, which does not reach to dorsal surface 16
- 14 Tergite 3 of gaster with a crease separating laterotergite along its whole length. Hind femur more than 6.6 times as long as deep. Hind tibia yellow, with its distal 0.2 blackish *gudrunae* sp. n. (p. 23)
- Tergite 3 of gaster with a crease separating laterotergite on only its anterior 0.5. Hind femur at

length 8.5 mm. Tergite 1 of gaster 1.80 times as long as broad. Tergite 3 with a crease along its anterior 0.5 separating the laterotergite.

Colour: black and yellow. Antenna black with scape, pedicel and proximal and distal parts of flagellum yellow ventrally. Maxillary palp with segments 1 yellowish, 2 and 3 reddish, 4 and 5 blackish. Posterior part of propodeum yellow, narrowly black posteriorly. Hind coxa black with a yellow dorsal spot and narrow postero-ventral margin. Hind femur yellow, black medially. Segments of gaster each black anteriorly, yellow posteriorly.

REMARKS. The male should be readily recognized by the form of the antennal flag setae. The female is keyed to a large extent on colour characters but the form of the posterior part of the gaster is also important.

BIOLOGY AND HOSTS. Unknown. The specimens were taken in July and August.

DISTRIBUTION (Map 2, p. 16). Known from only two specimens collected in the Pamir.

MATERIAL EXAMINED

Holotype ♂, U.S.S.R.: Pamir, Umss-Tugai, 25.vii.1928 (*Rickmers*) (ZSBS).

Paratype ♀, U.S.S.R.: Pamir, Maz, 3580 m, 15.viii.1928 (*Reinig*) (MNHU).

Banchus altaiensis Meyer nomen dubium

Banchus altaiensis Meyer, 1927b: 295. Type(s) ♂, U.S.S.R. (destroyed).

This species was described from material, probably only one specimen, collected in the Altai mountains. The description does not fit adequately any of the species from Central Asia known to me and I hesitate to identify it with any species not proven to occur there. Its identification will have to wait until more extensive collections have been made in the area.

Banchus cerinus Chandra & Gupta

(Figs 6, 12)

Banchus cerinus Chandra & Gupta, 1977: 185. Holotype ♀, INDIA (GC) [examined].

DESCRIPTION. Female. Width of lower face 0.85 times vertical length of eye. Maxillary palp as in Fig. 12. Antenna with apical segments longer than broad. Scutellar spine of moderate length. Mesopleuron and mesoscutum weakly coriaceous, with dense, fairly small punctures. Hind femur 6.25 times as long as deep. Fore wing length 14.3 mm. Tergite 1 of gaster 2.75 times as long as broad, its dorsal profile as in Fig. 6. Gaster subcylindrical, only weakly compressed posteriorly, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.6 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 6.

Colour: mainly yellow, with black marks. Face yellow with a black mark between and just below antennal sockets. Antenna yellow with distal half of flagellum and an externo-lateral mark on pedicel blackish. Maxillary palp yellowish. Posterior part of propodeum yellow. Hind coxa yellow, blackish distally. Hind femur yellow. Segments of gaster yellow, with basal third of tergites 1, 2 and 3 and of sternite 2 black.

Male. Unknown.

REMARKS. A pale-coloured species with relatively long appendages. Its closest relatives seem to be *tholus* and *tumidus*.

DISTRIBUTION (Map 4, p. 20), BIOLOGY AND HOSTS. The species is known only from the holotype, which was collected amongst mixed bushes in coniferous forest in the NW. Himalayas (Gupta, 1975: (appendix) 50).

MATERIAL EXAMINED (1 ♀)

India: 1 ♀ (holotype), Himachal Pradesh, Ahla, 2286 m, 18.vii.1971 (*Gulati*) (GC).

Banchus crefeldensis Ulbricht

(Figs 4, 13, 34, 60, 83, 104, 125)

Banchus crefeldensis Ulbricht, 1916: 12. Holotype ♂, WEST GERMANY (A. Ulbricht coll., Krefeld) [examined].

Banchus croaticus Hensch, 1928: 99. Lectotype ♀, YUGOSLAVIA (ZPZ), designated by Horstmann, 1982a: 82 [examined].



Map 2 Distribution of *Banchus agathae*, *B. japonicus*, *B. mauricettei*, *B. nox*, *B. sanjozanus*, *B. tholus* and *B. tumidus*.

DESCRIPTION. Female. Width of lower face 0.90–1.00 times vertical length of eye. Malar space 0.60–0.75 times basal width of mandible. Maxillary palp as in Fig. 13. Antenna with apical segments longer than broad. Scutellar spine (Fig. 34) about 0.3 as long as scutellum. Mesopleuron and mesoscutum strongly coriaceous, with moderately strong punctures, on mesopleuron separated by about their diameter. Hind femur 6.35–7.50 times as long as deep. Fore wing length 9.9–10.7 mm. Tergite 1 of gaster 1.80–2.00 times as long as broad, its dorsal profile as in Fig. 60 (male). Gaster compressed from segment 4, reaching about to tips of fore wings (when folded back). Tergite 3 with a crease along its entire length separating laterotergite. Tergite 7 and sternite 6 as in Fig. 83.

Colour: black and yellow. Face black with broad yellow orbital stripes and a vertical yellow mark below each antennal socket. Antenna entirely black except for a yellow patch on underside of scape, and rarely also on pedicel. Maxillary palp blackish with part or all of segment 2 and proximal 0·7 of segments 3 and 4 reddish yellow. Posterior part of propodeum yellow anteriorly, black posteriorly. Hind coxa black with a yellow dorsal patch. Hind femur black, yellow proximally and distally and sometimes dorsally. Segments of gaster each black anteriorly and broadly yellow posteriorly.

Male. Width of lower face 0·90–1·00 times vertical length of eye. Malar space 0·55–0·70 times basal width of mandible. Maxillary palp as in Fig. 104; segment 4 narrow and cylindrical, flattened and widened only at its extreme distal apex; segment 5 less than 0·2 as long as 4. Antennal flag setae (Fig. 125) at about 50 degrees, not flattened, 2 or 3 per segment, not arising from a trough. Hind femur 6·60–7·65 times as long as deep. Fore wing length 9·1–10·8 mm. Tergite 1 of gaster 1·80–2·10 times as long as broad (Fig. 4). Tergite 3 with a crease along its entire length separating laterotergite.

Colour: black and yellow. Antenna black, with scape and pedicel yellow ventrally. Maxillary palp blackish with segments 2 wholly and 3 and 4 proximally reddish yellow. Posterior part of propodeum black with a variable amount of yellow anteriorly, ranging from a very broad band along posterior transverse carina to a small median spot to absent entirely. Hind coxa black, usually with a yellow dorsal patch. Hind femur black, yellow proximally and distally and sometimes dorsally. Segments of gaster each black anteriorly, yellow posteriorly (on at least tergites 2 and 3 relatively broadly so).

REMARKS. Like the related *B. palpalis*, this is a very distinctive species; it is readily recognized by the structure of the maxillary palps and its coloration.

BIOLOGY AND HOSTS. Dates of collection range from mid-February (in Spain and Portugal) to mid-May (in Scotland and Ireland). Stelfox (1936: 63) records males flying in numbers round ivy (*Hedera helix*) and gorse (*Ulex europaeus*) in Ireland. Specimen labels indicate capture of males on *Betula* and around *Buxus* and females from pine.

I have seen 11 reared specimens, 3 without a satisfactory host identification, the remaining 8 (including both sexes) from *Aporophyla lutulenta* (Denis & Schiffermüller) or *A. lutulenta* 'subspecies' *lueneburgensis* (Freyer) (Noctuidae). The named hosts were collected at Bussum, Netherlands; Aviemore, Great Britain; and Bremen and near Hamburg, West Germany.

DISTRIBUTION (Map 3, p. 18). Widely distributed in Europe but not found in Scandinavia or the U.S.S.R. In Great Britain it is restricted to the Scottish Highlands.

MATERIAL EXAMINED (40 ♀, 79 ♂)

Austria, Belgium, France, Great Britain, Hungary, Ireland, Italy, Netherlands, Portugal, Spain, Switzerland, Tunisia, Turkey, West Germany, Yugoslavia (BMNH, FSA, IEE, IRSNB, LELW, MHN, MNHN, NM, NMB, NR, RNH, UM, USNM, ZC, ZSBS).

***Banchus dilatatorius* (Thunberg) stat. rev.**

(Figs 2, 14, 35, 36, 61, 84, 105)

Ichneumon acuminator Fabricius, 1787: 268. Type(s) ♂, EAST GERMANY (lost). [Junior primary homonym of *Ichneumon acuminator* Müller, 1776: 157.] **Syn. n.**

Ichneumon compressus Fabricius, 1787: 381. Holotype ♀, SWEDEN (UZM) [examined]. [Junior primary homonym of *Ichneumon compressus* Sulzer, 1776: 190.]

Ichneumon dilatatorius Thunberg, 1822: 279; 1824: 360. Holotype ♀, GERMANY (UU) [not examined].

Banchus sibiricus Meyer, 1927b: 294. Syntypes ♀, ♂, U.S.S.R. (destroyed). **Syn. n.**

NOMENCLATURE. In most of the literature this species is referred to by the invalid name *compressus*.

Although *Ichneumon acuminator* has been placed previously in *Banchus* it has never been identified. The description fits certain males of *dilatatorius* if one allows that Fabricius failed to observe the pale colour of the underside of the antennae.

The description of *Banchus sibiricus* fits well specimens from Kamchatka (which include those identified by Roman (1931: 29) as *lavrovi* var.) which are considered conspecific with *dilatatorius* but are discussed under 'Remarks' below. The identity of the female from Rumania determined as *sibiricus* by Constanteanu & Pisičá (1959: 190) is not known.

DESCRIPTION. Female. Width of lower face 1·15–1·25 times vertical length of eye. Malar space 0·80–1·00 times basal width of mandible (Fig. 2). Maxillary palp as in Fig. 14. Antenna with apical segments about as broad as long. Scutellar spine (Figs 35, 36) very small or virtually absent. Mesopleuron and mesoscutum coriaceous, with strong punctures, on mesopleuron separated by less than diameter. Hind femur 4·35–4·85



Map 3 Distribution of *Banchus crefeldensis*.

times as long as deep. Fore wing length 8.7–11.5 mm. Tergite 1 of gaster 1.30–1.40 times as long as broad, its dorsal profile as in Fig. 61. Gaster strongly compressed from posterior of tergite 3, reaching beyond tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 84.

Colour: black and yellow (the yellow often rather creamy). Face black with yellow orbital marks. Antenna with scape and pedicel black, scape, and usually pedicel, yellowish or reddish ventrally. Flagellum yellowish orange, with base of segment 1 and distal segments dark. Maxillary palp blackish, entirely or with segments 2 and 3 brownish. Posterior part of propodeum black, entirely or, more usually, with a yellow band along posterior transverse carina, the band usually not extensive and narrowly absent medially. Hind coxa black. Hind femur black, narrowly yellowish proximally and usually widely yellowish distally. Segments of gaster each black anteriorly, yellow posteriorly, the yellow bands usually less than 0.3 of length of segments.

Male. Width of lower face 1.10–1.25 times vertical length of eye. Malar space 0.85–0.95 times basal width of mandible. Maxillary palp as in Fig. 105; segment 4 only slightly flattened and widened distally; segment 5 about 0.9 as long as 4. Antennal flag setae (similar to Fig. 126) upright, flattened, relatively narrow, 2 per segment, arising from a polished trough. Hind femur 4.35–5.00 times as long as deep. Fore wing length 8.6–10.7 mm. Tergite 1 of gaster 1.25–1.55 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating laterotergite.

Colour: black and yellow. Antenna blackish or brownish dorsally, yellow or yellowish ventrally (except for apex of flagellum which is dark). Maxillary palp blackish or brownish. Posterior part of propodeum black, entirely or with a yellow band (sometimes broken medially) along posterior transverse carina. Hind coxa black. Hind femur yellow with a black mark on interno-lateral and ventral surface, and sometimes also dorsally near base. Segments of gaster each black anteriorly, yellow posteriorly, the yellow bands usually less than 0.3 of length of segment.

REMARKS. This species is distinctive and easily identified. The very wide face is a conspicuous feature. However, the poor characters used in earlier keys led to confusion with other species in several of the collections examined.

The details of colour given in the description above do not apply fully to all of the material examined. One female from Iran (AC) has the yellow coloration much more extensive than in any other specimens seen. All the specimens from Kamchatka (1 ♀ (MLSU) and 4 ♀, 2 ♂ (NR)) have yellow absent but with reddish in place of the yellow on the legs and on the face of the male, and with the margins of some or all of tergites 1, 2 and 3 of the gaster narrowly to broadly reddish brown. Other than in these colour characters the Iranian and Kamchatka specimens do not differ much from 'typical' *dilatatorius*. It is impossible to decide whether or not they represent extremes of colour variation or distinct species. Unfortunately the character which might enable a decision to be reached, the male flag setae, cannot be investigated. Of the two male specimens one lacks the head completely and the other lacks both antennae. The Kamchatka specimens match the description of *B. sibiricus* which was described from Irkutsk (see 'Nomenclature' above). The material from Mongolia identified by Momoi (1973: 242–243) as *lavrovi* might also be this dark form of *dilatatorius*. I could not examine these Mongolian specimens because Momoi has so far failed to return them to Budapest (Zombori, pers. comm.). The six specimens in Stockholm (NR) had been identified by Roman (1931: 29) as *lavrovi* var.

BIOLOGY AND HOSTS. This is an early spring species with most records relating to the period from late March to late April. The earliest dates of collection (7 and 13 March) come from sand dune areas in the Netherlands. The label on one female records that it was found on catkins of *Salix caprea*. I have seen no reared specimens of this species, although the following hosts are recorded in the literature: *Blepharita adusta* (Esper) (Noctuidae) (Bajári, 1960: 260); *Euxoa nigricans* (Linnaeus) (Noctuidae) (Schmiedeknecht, 1910: 1926; Meyer, 1934: 228); *Phlogophora meticulosa* (Linnaeus) (Noctuidae) (Györfi, 1944: 106); *Euproctis similis* (Fuessly) (Lymantriidae) (de Gaulle, 1907: 19); and *Leucoma salicis* (Linnaeus) (Lymantriidae) (Leonardi, 1928: 83).

DISTRIBUTION (Map 4, p. 20). Western and central Europe, mainly north of 50 degrees N. (but with very few records from the area bordering the Atlantic (France, the British Isles and Norway) and only a few from Denmark and Sweden); the European Alps; and with some scattered records in the western U.S.S.R., north-west Iran and the Soviet Far East (see 'Remarks' above).

MATERIAL EXAMINED (86 ♀, 96 ♂)

Austria, Belgium, Czechoslovakia, Denmark, East Germany, Finland, France, Great Britain, Hungary, Iran, Italy, Netherlands, Sweden, Switzerland, U.S.S.R., West Germany (AC, BMNH, BRI, HC, IP, IRSNB, ITZ, LELW, MNHN, MHN, MIZS, NMB, NR, RNH, SMT, USNM, UZI, UZM, ZC, ZIL, ZMU, ZSBS).

Banchus falcatorius (Fabricius)

(Figs 5, 9, 10, 15, 37, 38, 62, 85, 106, 129)

Ichneumon falcatorius Fabricius, 1775: 332. Holotype ♂, DENMARK (UZM) [examined].

Ichneumon variegator Fabricius, 1775: 339. LECTOTYPE ♂, SWEDEN (UZM), here designated [examined].

Ichneumon intersectus Geoffroy, 1785: 414. Type(s) ♂, FRANCE (lost) (Horstmann, 1982b: 243).

Ichneumon aries Christ, 1791: 339. Type(s) ♀, no type-locality (lost).

Ichneumon labiatus Schrank, 1802: 264. Syntypes ♀ [not ♂ as stated by Schrank], WEST GERMANY (lost).

Ichneumon histrio Schrank, 1802: 265. Syntypes ♂, WEST GERMANY and FRANCE (lost) (Horstmann, 1982b: 243). [Junior primary homonym of *Ichneumon histrio* Christ, 1791: 356.]

Ichneumon tricolor Schrank, 1802: 286. Syntypes ♂, WEST GERMANY (lost).

Banchus falcatorius Fabricius, 1804: 128. [Unjustified emendation of *Ichneumon falcatorius* Fabricius, 1775.]

Corynephanes sachalinensis Matsumura, 1911: 92. Lectotype ♂ [not ♀ as stated by Matsumura], U.S.S.R. (EIHU), designated by Townes, Momoi & Townes, 1965: 236 [examined].

Banchus falcatorius var. *luteofasciatus* Ulbricht, 1911: 151. Type(s) ♀, HUNGARY (?lost).

Banchus nobilitator Morley, 1915: 138. Holotype ♀, U.S.S.R. (BMNH) [examined].

Banchus falcatorius var. *sanguinator* Meyer, 1922: 139. Holotype ♂, U.S.S.R. (destroyed).

Banchus lavrovi Meyer, 1927b: 294. Syntypes ♀, ♂, U.S.S.R. (destroyed).

Banchus falcatorius var. *nigromarginatus* Constantineanu & Pisciă, 1960: 710. Syntypes 3 ♀, RUMANIA (?Constantineanu coll.) [not examined].

Banchus propitius Kuslitzky, 1979: 351. Holotype ♂, MONGOLIA (ZIL) [not examined]. [Provisional synonymy.]



Map 4 Distribution of *Banchus cerinus*, *B. dilatatorius* and *B. turcator*.

NOMENCLATURE. *Ichneumon labiatus* was listed by Dalla Torre (1901: 63) in the synonymy of *compressus* (= *dilatatorius*). However, as noted by Gravenhorst (1829: 390) the description applies to *B. falcatorius*. Schrank misdetermined the sex of his species.

Ichneumon tricolor has been synonymised usually with *compressus* (= *dilatatorius*) (e.g. Aubert, 1978: 153). The description and the figure to which Schrank refers (Schaeffer, 1768: pl. 116, fig. 5), differ from that species in the coloration of the gaster. However, they fit the male of *B. falcatorius* and there can be little doubt about the identity of the two species. This synonymy was first proposed by Gravenhorst (1829: 396).

The synonymy of *sanguinator* might be questioned. I have seen no male of *B. falcatorius* as red as described by Meyer; the most reasonable explanation of the colour is that the specimen had suffered from overlong exposure to cyanide in a killing jar.

The description of *lavrovi* fits specimens from the northern part of the eastern Palaearctic and here included in *falcatorius*. One such specimen determined as *lavrovi* by Meyer himself has been examined. The oldest name applying to this form of *falcatorius* is *nobilitator* Morley.

In terms of *falcatorius* as recognized in this revision (see 'Remarks' below) I have thought it best provisionally to synonymize the species, *propitius*, recently described by Kuslitzky (1979).

DESCRIPTION. Female. Width of lower face 0.95–1.00 times vertical length of eye. Malar space 0.60–0.70 times basal width of mandible. Maxillary palp as in Fig. 15. Antenna with apical segments just longer than broad. Scutellar spine (Fig. 37) minute or absent (but see 'Remarks'). Mesopleuron and mesoscutum

coriaceous, with moderately strong punctures, on mesopleuron separated by less than their diameter. Hind femur 4.25–4.70 times as long as deep. Fore wing length 10.1–11.2 mm. Tergite 1 of gaster 1.45–1.70 times as long as broad, its dorsal profile as in Fig. 62. Gaster (Figs 9, 10) strongly compressed, reaching beyond tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 85.

Colour: mainly black, with legs largely reddish and usually some reddish and very rarely yellow on the gaster. Face black, often with very small reddish or yellowish orbital spots. Antenna dark brown or blackish dorsally, brown or reddish ventrally. Maxillary palp reddish with segments 4 apically and 5 wholly dark. Posterior part of propodeum entirely black. Hind coxa black, very rarely with a postero-ventral reddish spot. Hind femur reddish yellow, entirely or, in a few specimens, blackish medially. Segments of gaster black, rarely entirely so, usually with variable reddish marks on segments 1, 2 and 3 and more rarely on other segments. Very rarely reddish areas grade to yellow posteriorly.

Male. Width of lower face 0.95–1.10 times vertical length of eye. Malar space 0.65–0.75 times basal width of mandible. Maxillary palp as in Fig. 106; segment 4 considerably widened and flattened; segment 5 about 0.5 as long as 4. Antennal flag setae (Fig. 129) upright, long, flattened and considerably widened, 3 (sometimes 4) per segment, arising from a polished trough. Hind femur (Fig. 5) 4.45–5.25 times as long as deep. Fore wing length 9.2–11.7 mm. Tergite 1 of gaster 1.40–1.70 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating the laterotergite.

Colour: black, yellow and reddish. Antenna black dorsally (and ventrally at distal apex of flagellum), yellow ventrally. Maxillary palp with segment 1 yellow, segments 2 and 3 wholly and 4 proximally reddish yellow, segment 4 distally and 5 wholly brown or blackish. Posterior part of propodeum yellow anteriorly, black posteriorly, the yellow sometimes reduced to a pair of latero-median spots or entirely absent. Hind coxa black, usually with a yellowish or reddish patch postero-ventrally and sometimes also dorsally. Hind femur reddish yellow, almost always entirely but in a few specimens blackish medially. Gaster with tergite 1 black anteriorly, reddish and then yellow posteriorly; tergites 2 and 3 each reddish anteriorly, yellow posteriorly (with some blackish laterally); remaining tergites black, 4, 5 and 6 each with a postero-median yellow spot.

REMARKS. *B. falcatorius* has several specialized features and it is the species in which sexual dimorphism is most marked. There is also some geographical variation in characters; for instance, specimens from the eastern part of the range have the hind femur darkened medially and a few specimens from Turkey have a well-developed spine on the scutellum. More than one species might be included in the taxon here recognized, but in the limited material from the eastern Palaearctic available for study no clear-cut segregates could be recognized.

Although the sex association in this species is not in doubt, interesting confirmation comes from the discovery of four gynandromorph specimens in the extensive material examined. These were the only gynandromorphs found (or at least recognized) during the present study. Details of the specimens are as follows.

Italy: Piemonte, Susa, 24.vi.1872 (*Gribodo*) (MCSN). Head male (unfortunately the antennal flagella are missing), thorax and abdomen female. Italy: Cadore, Valle del Boite (IEUB). Head female; thorax and propodeum apparently mainly female but with yellow marks on the left of the mesoscutum and scutellum (male characters), gaster apparently male (including the genitalia) but with some bilateral asymmetry in colour anteriorly. ?locality [illegible] (*Giraud coll.*) (MNHN). Head (including antennae and palps) male on the left and female on the right, prothorax and anterior of mesothorax mainly female but partly male on left, posterior of mesothorax and remainder of body female. Interestingly this specimen had been labelled (anonymously) as a hybrid between *falcatorius* and *monileatus* [= *palpalis*]. Denmark: Ordrup, 19.viii.1877 (*Drewsen*) (UZM). Head (including appendages) female, remainder male except that the dark colour of the left fore and mid coxae suggests some female influence.

BIOLOGY AND HOSTS. This species is on the wing from early June to mid August (with a few records for late May and late August). The adults have often been collected from umbellifer flowers. One female is labelled as being the prey of *Dasyopogon teutonius* (Diptera; Asilidae).

Despite the abundance of specimens in collections there are very few reared examples, and not all of those have an attached host name or host remains. The most reliable host data relate to *Agrotis segetum* (Denis & Schiffermüller) (Noctuidae) and this is certainly an important host species. It is (or was) a major pest of root crops (particularly various beets and carrots) and its association with *B. falcatorius* was the subject of research in the U.S.S.R. in the 1920s and 30s (Kosobutzkii, 1928; Meyer, 1927a, 1928; Pospelov, 1924; Samoilova, 1936). The long, knife-like gaster of the female is undoubtedly adapted to enable it to reach the host larvae, which feed at soil level. Other hosts recorded on specimen labels are: *Deilephila porcellus* (Linnaeus) and *D. elpenor* (Linnaeus) (Sphingidae), *Dasychira fascelina* (Linnaeus) (Lyman-

triidae), *Acrionicta megacephala* (Denis & Schiffermüller) (Noctuidae) and *Melitaea didyma* (Esper) (Nymphalidae). The last named host record seems unlikely to be accurate, but it is difficult to judge the others (all the specimens are without locality or date!). Other hosts recorded in the literature are: *Agrotis exclamationis* (Linnaeus) (Noctuidae) (Meyer, 1927a: 81) and, erroneously, two Hymenoptera (*Diprion pini* (Linnaeus) (Diprionidae) and *Ophion luteus* (Linnaeus) (Ichneumonidae) (Maneval, 1935: 74)).

DISTRIBUTION (Map 5, p. 22). Most of the Palearctic, but few specimens seen from large areas of the U.S.S.R. and further east than the Caucasus none from south of 50 degrees N. In the more southern parts of its range in the western Palearctic it is apparently restricted to higher altitudes.

MATERIAL EXAMINED (652 ♀, 806 ♂)

Austria, Belgium, Bulgaria, Corsica, Czechoslovakia, Denmark, East Germany, Finland, France, Great Britain, Greece, Italy, Netherlands, Norway, Poland, Rumania, Sakhalin, Spain, Sweden, Switzerland, Turkey, U.S.S.R., West Germany, Yugoslavia (AC, BC, BMNH, BRI, CM, EIHU, FSA, HC, IEE, IEUB, IP, IRSNB, ITZ, IZPAN, JC, JKC, KHC, LELW, MCSN, MHN, MNHN, MNHU, MUM, NMB, NR, PC, RNH, SC, SMT, UM, USNM, UZI, UZM, VRC, ZIL, ZIM, ZMU, ZC, ZSBS).



Map 5 Distribution of *Banchus falcatorius* and *B. flavomaculatus*.

Banchus flavomaculatus (Cameron)

(Figs 16, 39, 63, 86, 107)

Cidaphurus flavomaculatus Cameron, 1904: 346. Lectotype ♀ [not ♂ as stated by Cameron and by Morley, 1913], INDIA (BMNH), fixed by Morley, 1913: 255.

NOMENCLATURE. The lectotype and one paralectotype female (BMNH) are the only known syntype specimens. Both bear labels '*Cidaphurus flavomaculatus* Cam. Simla' in Cameron's handwriting. The lectotype has, in addition, Nurse's typewritten data label 'Simla 5.97.'. It is unfortunate that Cameron's original description applies better to the paralectotype because it is not conspecific with the lectotype and is *B. punkettai*.

DESCRIPTION. Female. Width of lower face 0.75–0.80 times vertical length of eye. Malar space 0.50–0.55 times basal width of mandible. Maxillary palp as in Fig. 16. Antenna with apical segments about as broad as long. Scutellar spine (Fig. 39) varying from very short to about 0.5 as long as scutellum. Mesopleuron and mesoscutum shining, weakly coriaceous, with moderate punctures, on mesopleuron separated by about or a little more than their diameter. Hind femur 5.60–5.65 times as long as deep. Fore wing length 8.8–9.2 mm. Tergite 1 of gaster 2.25–2.35 times as long as broad, its dorsal profile as in Fig. 63. Gaster strongly compressed from posterior of segment 3, reaching to about tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 86.

Colour: black and reddish, with some yellow marks. Face reddish, yellowish laterally and with a black median stripe. Antenna blackish dorsally, scape and pedicel yellowish ventrally, flagellum brown ventrally. Maxillary palp reddish yellow, segments 4 distally and 5 wholly dark. Posterior part of propodeum entirely reddish. Hind coxa black with large dorsal and postero-ventral reddish patches. Hind femur reddish with a black stripe ventrally. Segments of gaster black anteriorly, very broadly reddish posteriorly.

Male. Width of lower face 0.80 times vertical length of eye. Malar space 0.60 times basal width of mandible. Maxillary palp as in Fig. 107; segment 4 considerably widened and flattened; segment 5 about 0.5 as long as 4. Antennal flag setae (similar to Fig. 126, but setae slightly longer) upright, long, flattened, 2 per segment, arising from a polished trough. Hind femur 5.25 times as long as deep. Fore wing length 8.3 mm. Tergite 1 of gaster 2.30 times as long as broad. Tergite 3 with a crease along its anterior 0.5 separating laterotergite.

Colour: black and yellow, with some reddish, especially on legs. Antenna black dorsally, scape and pedicel yellow ventrally, underside of flagellum reddish yellow proximally and distally, black medially. Maxillary palp with segments 1 brownish, 2 reddish yellow, 3 brownish and 4 and 5 blackish. Posterior part of propodeum entirely yellow. Hind coxa black, with a yellow dorsal spot contiguous interno-laterally with a postero-ventral spot. Hind femur reddish yellow with a black mark ventrally. Segments of gaster each black anteriorly, yellow posteriorly, the yellow tending to reddish, especially on sternites.

REMARKS. See 'Remarks' under *nox*.

BIOLOGY AND HOSTS. Virtually unknown. Adults have been collected in May and October. The specimens collected at Simla by Gupta and Joseph were from coniferous and deodar forest (Gupta, 1971: (appendix 2, 3, 54).

DISTRIBUTION (Map 5, p. 22). Along the southern flank of the Himalayas at about 2000 m.

MATERIAL EXAMINED (11 ♀, 2 ♂).

India: 1 ♀, Himachal Pradesh, Simla, v.1897 (*Nurse*) (BMNH) (lectotype); 4 ♀, 1 ♂, Himachal Pradesh, Simla, 2133 m, 1 & 10.x.1962, 3.x.1966 (*Gupta, Joseph*) (GC); 1 ♀, Uttar Pradesh, Khurpatal, 11.x.1978 (*Gupta*) (GC); 1 ♀, 1 ♂, Uttar Pradesh, Mussoorie, 2100 m, 1.x.1962, 21.x.1972 (*Gupta, Khana*) (GC); 3 ♀, Uttar Pradesh, Nainital, 1938 m, 2–10 & 12.x.1978 (*Gupta*) (GC). **Nepal:** 1 ♀, 3–2 km SE. of Sikha, 2100–2400 m, 23.v.1954 (*Quinlan*) (BMNH).

***Banchus gudrunae* sp. n.**

(Figs 17, 40, 65, 66, 87, 108)

DESCRIPTION. Female. Width of lower face 0.75–0.85 times vertical length of eye. Malar space 0.45–0.55 times basal width of mandible. Maxillary palp as in Fig. 17. Antenna with apical segments longer than broad. Scutellar spine (Fig. 40) about 0.7 as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderately strong punctures, on mesopleuron separated by about their diameter. Hind femur 6.75–7.20 times as long as deep. Fore wing length 9.7–10.7 mm. Tergite 1 of gaster 2.00–2.50 times as long

as broad, its dorsal profile as in Figs 65 (male), 66 (female). Gaster compressed from tergite 4, reaching about to tips of fore wings (when folded back). Tergite 3 with a crease along its whole length separating laterotergite. Tergite 7 and sternite 6 as in Fig. 87.

Colour: black and yellow. Face yellow with a black median stripe. Antenna black (sometimes slightly brownish distally), scape, and sometimes pedicel, with a yellow patch beneath. Maxillary palp reddish yellow with segment 1 and distal parts of 4 and 5 blackish. Posterior part of propodeum yellow, narrowly black posteriorly. Hind coxa black with a yellow dorsal patch. Hind femur yellowish with proximal half largely black. Segments of gaster each black anteriorly, yellow posteriorly, the yellow bands relatively wide.

Male. Width of lower face 0.80–0.90 times vertical length of eye. Malar space 0.45–0.65 times basal width of mandible. Maxillary palp as in Fig. 108; segment 4 flattened and widened distally; segment 5 about 0.5 as long as 4. Antennal flag setae (similar to Fig. 127, but with setae slightly shorter and very much broader) upright, relatively short, flattened and very broad, 2 (occasionally 3) per segment, arising from a polished trough. Hind femur 7.00–7.45 times as long as deep. Fore wing length 8.8–10.0 mm. Tergite 1 of gaster 2.10–2.40 times as long as broad. Tergite 3 with a crease along its whole length separating laterotergite.

Colour: black and yellow. Antenna black dorsally, scape and pedicel yellow ventrally, flagellum brownish ventrally. Maxillary palp reddish yellow, segment 1 dorsally narrowly black, segment 4 distally and 5 wholly blackish. Posterior part of propodeum yellow, very narrowly black posteriorly. Hind coxa black with a large yellow dorsal patch. Hind femur yellow, blackish on its proximal 0.3, especially ventrally and laterally. Segments of gaster each black anteriorly, very broadly yellow posteriorly.

REMARKS. This species has a number of characters which make relating it to any others in the Palaearctic difficult. The form of the male palp suggests a relationship with *palpalis* and *crefeldensis* but the flag setae are of a very much more specialized kind and the female palp is not specialized in the same way.

BIOLOGY AND HOSTS. Unknown. Dates of collection of adults range from the middle of November to the middle of January.

DISTRIBUTION (Map 6, p. 27). Known only from the island of Cyprus.

MATERIAL EXAMINED

Holotype ♂, **Cyprus**: Polemedia Hills, 14.xii.1948 (*Mavromoustakis*) (BMNH).

Paratypes 10 ♀, 9 ♂. **Cyprus**: 6 ♀, 3 ♂, Polemedia Hills, 14 & 20.xii.1948 (*Mavromoustakis*) (BMNH); 3 ♀, Palodkia, 5 & 12.i.1949 (*Mavromoustakis*) (BMNH); 1 ♀, Limassol, 4.i.1940 (*Mavromoustakis*) (USNM); 4 ♂, Zakaki Marshes, 29.xi.1946 (*Mavromoustakis*) (TC); 1 ♂, near Limassol, 18.xi.1946 (*Mavromoustakis*) (TC); 1 ♂, Paphos district, near Panayia, 900 m, 29.xi.1946 (*Mavromoustakis*) (TC).

Banchus hastator (Fabricius)

(Figs 18, 41, 64, 88, 109, 124)

Ichneumon hastator Fabricius, 1793: 167. Holotype ♀, EUROPE (UZM) [examined].

Ichneumon pungitor Thunberg, 1822: 265; 1824: 320. [Replacement name for *Ichneumon hastator* Fabricius.]

Ichneumon reticulator Thunberg, 1822: 265; 1824: 321. Type(s) ♂, SWEDEN (lost). **Syn. n.**

Banchus femoralis Thomson, 1897: 2411. Lectotype ♀, SWEDEN (UZI), designated by Townes, Momoi & Townes, 1965: 237 [examined].

Banchus kolosovi Meyer, 1925: 10. Syntypes 3 ♀, U.S.S.R. (destroyed). **Syn. n.**

NOMENCLATURE. This species until recently has been referred to by the junior synonym *femoralis*. It is dealt with in a relatively large number of non-taxonomic papers so the name change is particularly unfortunate. A further source of confusion is the incorrect use of the name *hastator* by Townes & Townes (1978) (see nomenclatorial notes under *palpalis*).

Ichneumon pungitor is a junior objective synonym of *hastator*. It was proposed apparently because of the secondary homonymy in *Ichneumon*, in Thunberg's work, with *Foenus hastator* Fabricius, 1804 [which, incidentally, was miss-spelled as *vastator* by Thunberg (1822: 262; 1824: 315)]. The status of *pungitor* as a replacement name has not been recognized previously and it had been placed incorrectly in the synonymy of *B. volutatorius* (Linnaeus) (e.g. Aubert, 1978: 158).

Ichneumon reticulator has not been identified since its description. Roman (1912: 277) reported that there were no specimens in Thunberg's collection and suggested that the species was a *Banchus*. The description fits some males of *hastator*, with which it is here synonymised.

After its description, except for an entry in the *Zoological Record*, *B. kolosovi* was not referred to (even

by Meyer) until Aubert (1978: 166) noted its existence. Aubert miss-spelled the name as *kozlovi*. The description fits particularly dark specimens of *hastator*, with which it is here synonymised. Notwithstanding Meyer's comments on *kolosovi* and *femoralis*, it seems that he realised his mistake because in his treatment of the genus (1934: 229) he mentions, under *femoralis*, material from Sverdlovsk (the type-locality of *kolosovi*) collected by Kolosov. This is presumably the type-material of *kolosovi*. No material collected by Kolosov is noted under other *Banchus* species by Meyer.

DESCRIPTION. Female. Width of lower face 0.85–0.90 times vertical length of eye. Malar space 0.50–0.65 times basal width of mandible. Maxillary palp as in Fig. 18. Antenna with apical segments longer than broad. Scutellar spine (Fig. 41) about 0.2 as long as scutellum. Mesopleuron and mesoscutum coriaceous, usually fairly weakly so, with moderate punctures, on mesopleuron separated by about their diameter. Hind femur 4.50–5.15 times as long as deep. Fore wing length 8.8–10.9 mm. Tergite 1 of gaster 1.50–1.70 times as long as broad, its dorsal profile as in Fig. 64. Gaster weakly compressed, reaching about to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 88.

Colour: mainly black, with yellow and reddish, particularly on legs. Face black with yellow orbital marks, which are usually small but are sometimes large and with a pair of very small reddish marks in centre of face. Antenna with scape and pedicel black, scape, and usually pedicel, yellow ventrally. Flagellum brown dorsally, reddish ventrally, darker at extreme base and apex. Maxillary palp reddish with segment 1 black and segments 2 proximally, 4 distally and 5 wholly darker. Posterior part of propodeum entirely black. Hind coxa black. Hind femur reddish or yellowish proximally and distally, medially varying from reddish dorsally and blackish ventrally to all blackish. Segments of gaster black, sometimes almost entirely except for brownish posterior margin of sternites 1 and 6 and tergite 7, but usually with posterior margins of further segments narrowly yellowish and with the yellow grading into a wider brownish band.

Male. Width of lower face 0.90–1.00 times vertical length of eye. Malar space 0.50–0.65 times basal width of mandible. Maxillary palp as in Fig. 109; segment 4 only slightly widened and flattened; segment 5 almost as long as 4. Antennal flag setae (Fig. 124) relatively poorly differentiated, small, not flattened, 2 per segment, not arising from a trough. Hind femur 4.60–5.50 times as long as deep. Fore wing length 7.2–10.7 mm. Tergite 1 of gaster 1.45–1.80 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating laterotergite.

Colour: mainly black, with some reddish and yellow, particularly on legs. Antenna black dorsally, scape and pedicel yellow ventrally, flagellum reddish ventrally. Maxillary palp with segment 1 blackish or blackish and yellow, 2 and 3 reddish, 4 and 5 blackish or brownish. Posterior part of propodeum entirely black. Hind coxa black (in a single specimen with a small yellowish dorsal spot and the postero-ventral margin reddish). Hind femur reddish or yellowish proximally and distally, medially varying from reddish dorsally and blackish ventrally to all blackish. Gaster sometimes almost entirely black except for brownish posterior margins of some segments, but usually with posterior margins of segments narrowly yellowish with adjacent brownish bands.

REMARKS. This is an isolated species, with few obvious specializations. The primitive condition of the antennal flag setae in the male is particularly notable.

BIOLOGY AND HOSTS. The species is an important parasite of *Panolis flammea* (Denis & Schiffermüller) (Noctuidae), which is sometimes a serious pest in pine forests. *B. hastator* is univoltine and adults occur in May, June and early July. Reared specimens have emergence dates in March and April also. Some details of the biology and ecology of the species have been investigated as a result of the association with an economically important host. Most of the work has been connected with its effect as a natural control agent (Friederichs, 1936; Habermehl, 1922, 1924; Pfeffer, 1933; Scheidter, 1934; Schwerdtfeger, 1952; Smits van Burgst, 1927) but has included studies of embryonic and larval development and morphology (Beirne, 1941; Błedowski & Kraińska, 1926; Shevyrev, 1913), courtship, host identification and host-stage preferences, egg-laying and the reproductive system (van Veen, 1982).

There are many specimens reared from *P. flammea* in collections. Apart from that species, the following species are recorded as hosts on specimen labels: *Blepharita adusta* (Esper) (Noctuidae) (1 ♀, 2 ♂, Germany (Smits van Burgst coll.) LELW); *Deilephila porcellus* (Linnaeus) (Sphingidae) (1 ♂, no locality (Adkin) BMNH); *Hyloicus pinastri* (Linnaeus) (Sphingidae) (1 ♀, Poland (Mazur) IZPAN) and ?*Achlya flavicornis* (Linnaeus) (Thyatiridae) (1 ♀, Great Britain (Lyle) BMNH). While one might cast doubt on these records it is difficult to investigate them critically. Kolubajiv (1934: 114, 116) records *Lymantria dispar* (Linnaeus) (Lymantriidae) as a host.

DISTRIBUTION (Map 6, p. 27). Widely distributed in northern Europe as far east as Leningrad, perhaps extending further east to the Urals (if my synonymy of *kolosovi* is correct (see 'Nomenclature' above)). It also occurs in the European Alps and I have seen single individuals collected in Corsica and Yugoslavia.

MATERIAL EXAMINED (113 ♀, 151 ♂)

Belgium, Corsica, Denmark, East Germany, Finland, France, Great Britain, Ireland, Netherlands, Poland, Sweden, Switzerland, U.S.S.R., West Germany, Yugoslavia (AC, BC, BMNH, BRI, HC, IP, IRSNB, ITZ, IZPAN, LELW, KC, MNHN, MUM, NMB, NR, RNH, RSM, SC, SMT, UM, USNM, UZI, UZM, VRC, ZC, ZIL, ZMU, ZSBS).

Banchus insulanus Roman

(Figs 19, 42, 67, 89)

Banchus insulanus Roman, 1937: 18. Holotype ♀, MADEIRA (NR) [examined].

DESCRIPTION. Female. Width of lower face 0.85 times vertical length of eye. Malar space 0.55 times basal width of mandible. Maxillary palp as in Fig. 19. Antenna with apical segments longer than broad. Scutellar spine (Fig. 42) indistinct. Mesopleuron and mesoscutum coriaceous, with moderate punctures, on mesopleuron separated by more than their diameter. Hind femur 6.55 times as long as deep. Fore wing length 9.3–9.5 mm. Tergite 1 of gaster 1.65 times as long as broad, its dorsal profile as in Fig. 67. Gaster only weakly compressed, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its entire length separating laterotergite. Tergite 7 and sternite 6 as in Fig. 89.

Colour: mainly black, with yellow and reddish marks. Face black with irregular, yellow orbital marks. Antenna black. Maxillary palp blackish. Posterior part of propodeum black. Hind coxa black with a small yellow dorsal patch. Hind femur yellowish, blackish ventrally and posteriorly on its proximal 0.5. Segments of gaster blackish, in one specimen with only posterior 0.5 of tergite 3 and posterior 0.3 of tergite 7 reddish; in the other specimen with posterior 0.7 of tergite 2, almost all of tergite 3, posterior 0.5 of tergite 4, and tergites 5 and 6 laterally, reddish.

Male. Unknown (but see 'Remarks').

REMARKS. The specimen described as the male by Hellén (1949: 13) proved, on examination, to be a female. The material collected in 1959 and supposedly including both sexes (Hellén, 1961: 37) cannot be found in Hellén's collection (A. Albrecht, pers. comm.).

The relationships of the species are not at all obvious from the characters of the female.

BIOLOGY AND HOSTS. Unknown. Adults have been collected in May and July–August.

DISTRIBUTION (Map 6, p. 27). Known only from the island of Madeira.

MATERIAL EXAMINED (2 ♀)

MADEIRA: 1 ♀, 25 Fontes, Rabacal, 17.vii–4.viii.1935 (*Lunblad*) (NR) (holotype); 1 ♀, Ribeiro Frio, 3.v.1938 (*Frey*) (ZMU).

Banchus japonicus (Ashmead)

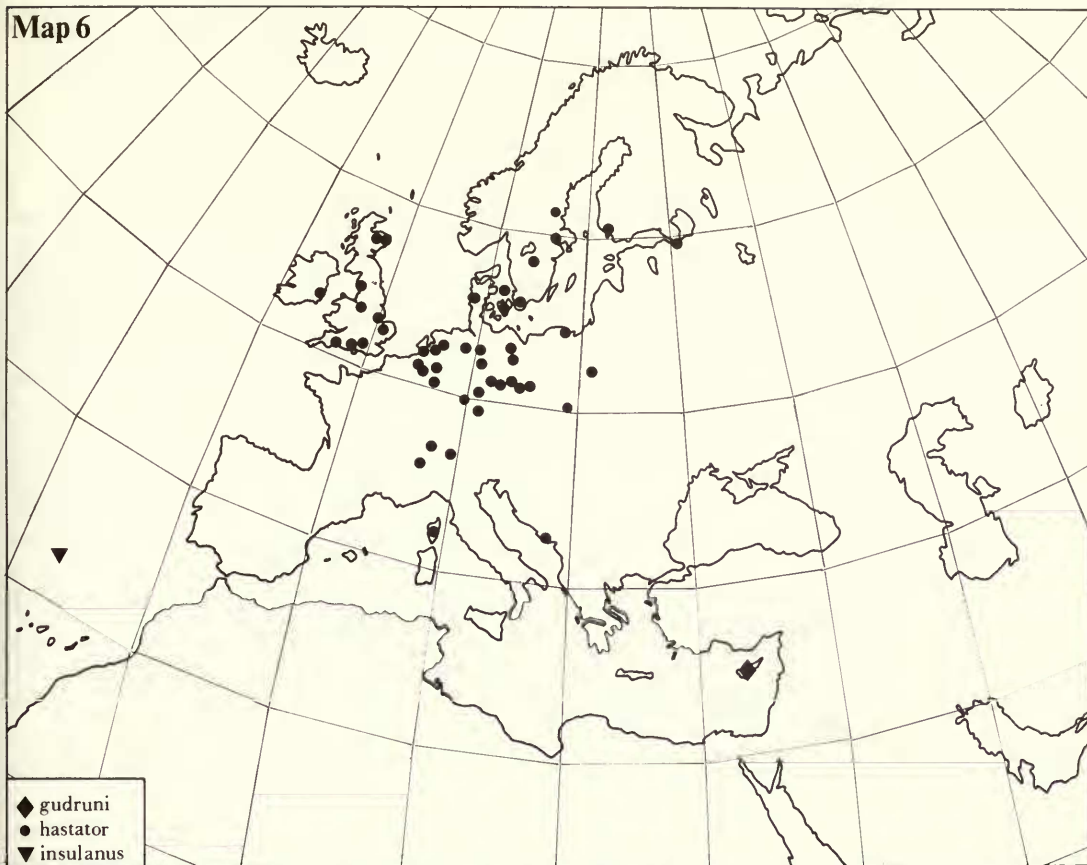
(Figs 20, 43, 68, 90, 110)

Nawaia japonica Ashmead, 1906: 185. LECTOTYPE ♀, JAPAN (USNM), here designated [examined].

NOMENCLATURE. Ashmead described this species from two specimens, also stating 'Type. – Cat. No. 7259, U.S.N.M.', thus giving the impression that one was the holotype. However, both specimens are labelled 'Type No. 7259 U.S.N.M.' and must be considered as syntypes. Other labels include 'Nawaia japonica Ashm' on one specimen and 'Nawaia japonica Ash. Paratype' on the other, the latter on a similar label but in a different hand and obviously more modern than the former. The specimen labelled as paratype also bears a label '47' and is in much better condition than the other. I have labelled and hereby designate it as lectotype.

DESCRIPTION. Female. Width of lower face 0.80–0.90 times vertical length of eye. Malar space 0.35–0.45 times basal width of mandible. Maxillary palp as in Fig. 20. Antenna with apical segments about as long as broad. Scutellar spine (Fig. 43) about 0.3 as long as scutellum. Mesopleuron and mesoscutum shining and only weakly coriaceous, with moderate punctures, on mesopleuron separated by about their diameter. Hind femur 5.55–6.50 times as long as deep. Fore wing length 9.2–12.1 mm. Tergite 1 of gaster 1.45–1.85 times as long as broad, its dorsal profile as in Fig. 68. Gaster only weakly compressed, reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.5 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 90.

Colour: black and yellow. Face yellow with a broad median black stripe and sometimes a black mark below each antennal socket. Antenna black, with a small yellow mark on scape. Maxillary palp blackish, with a longitudinal yellow stripe ventrally on segments 1 and 2. Posterior part of propodeum yellow,



Map 6 Distribution of *Banchus gudrunae*, *B. hastator* and *B. insulanus*.

entirely or with a black area postero-medially. Hind coxa black with a yellow dorsal patch. Hind femur blackish, yellow proximally and distally. Segments of gaster black with posterior margins broadly yellow and with a pair of yellow spots on tergite 2 and usually also on 1 and 3.

Male. Width of lower face 0.90 times vertical length of eye. Malar space 0.35–0.45 times basal width of mandible. Maxillary palp as in Fig. 110; segment 4 flattened and considerably widened; segment 5 about 0.5 as long as 4. Antennal flag setae (similar in appearance to Fig. 126, but with setae longer) upright, long, flattened, 2 per segment, arising from trough which is not polished. Hind femur 6.25–6.75 times as long as deep. Fore wing length 9.3–10.3 mm. Tergite 1 of gaster 1.50–1.65 times as long as broad. Tergite 3 with a crease along almost its entire length separating laterotergite.

Colour: black and yellow. Antenna black with scape, pedicel and proximal end of flagellar segment 1 yellow ventrally. Maxillary palp with segment 1 yellow, 2 and 3 brownish yellow to blackish, 4 and 5 black. Posterior part of propodeum yellow, entirely or with small black marks posteriorly. Hind coxa black and yellow. Hind femur yellow with a black mark ventrally and interno-laterally, usually extending also to dorsal surface. Segments of gaster black with posterior margins broadly yellow and with a pair of yellow spots on tergite 2 and usually also on 1 and 3.

REMARKS. Although *japonicus* has been confused with *poppiti* the two species are easily separated.

BIOLOGY AND HOSTS. Unknown. Adults have been collected in May and June.

DISTRIBUTION (Map 2, p. 16). Japan. Recorded also from Korea (Kim, 1955: 493), from which country the only species of *Banchus* examined is *B. palpalis*.

MATERIAL EXAMINED (6 ♀, 6 ♂)

Japan: 1 ♀, Gifu, Fujishiro (*Nawa*) (USNM) (lectotype); 1 ♀, Gifu, Gifu-yama (*Nawa*) (USNM) (paralectotype); 1 ♀, Hokkaido (*Uchida*) (TC); 1 ♀, 3 ♂, Hokkaido, Mt Soranuma, 26.vi.1965 and

15.vi.1968 (*Kusigemati*) (KC); 1 ♂, Hokkaido, Toya-ko, 14.vi.1967 (*Miyazaki*) (KC); 1 ♀, Honshu, Tokyo, Komaba, 9.v.1916 (*Hirayama*) (EIHU); 1 ♂, Honshu, Hyogo Pref., Ryuzoji, Sasayama, 5.v.1965 (*Nakanishi*) (NC); 1 ♀, Honshu, Tottori Pref., Mt Daisen, 12.vi.1963 (*Nakanishi*) (NC); 1 ♂, Honshu, Yatsugatake, 2.vi.1967 (*Kocha*) (KC).

***Banchus mauricettae* sp. n.**

(Figs 21, 44, 69, 91, 111)

DESCRIPTION. Female. Width of lower face 0.90–0.95 times vertical length of eye. Malar space 0.55 times basal width of mandible. Maxillary palp as in Fig. 21. Antenna with apical segments longer than broad. Scutellar spine (Fig. 44) about as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderate to strong punctures, on mesopleuron separated by a little more than their diameter. Hind femur 5.20–5.30 times as long as deep. Fore wing length 10.5–10.6 mm. Tergite 1 of gaster 1.90–2.35 times as long as broad, its dorsal profile as in Fig. 69 (male). Gaster moderately compressed, not quite reaching tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.6 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 91.

Colour: yellowish red with black and yellow marks. Face yellowish red with orbits yellow and sometimes with a blackish median stripe. Antenna entirely reddish yellow except for extreme apex of flagellum and scape and pedicel dorsally, which are blackish. Maxillary palp reddish yellow with segments 4 distally and 5 wholly dark. Posterior part of propodeum reddish, entirely or with black marks posteriorly. Hind coxa varying from reddish with black patches to almost entirely black. Hind femur entirely reddish. Segments of gaster entirely reddish or with some black anteriorly.

Male. Width of lower face 0.85–0.90 times vertical length of eye. Malar space 0.60–0.65 times basal width of mandible. Maxillary palp as in Fig. 111; segment 4 flattened and widened; segment 5 about 0.8 as long as 4. Antennal flag setae (similar in appearance to Fig. 129, but with setae only two-thirds as long) upright, fairly short and broad, 3 (occasionally 4) per segment, arising from a polished trough. Hind femur 5.95–6.20 times as long as deep. Fore wing length 11.2–12.3 mm. Tergite 1 of gaster 2.20–2.35 times as long as broad. Tergite 3 with a crease along its anterior 0.6 separating laterotergite.

Colour: yellow, reddish and black. Antenna blackish dorsally, scape and pedicel yellow ventrally, flagellum reddish yellow ventrally. Maxillary palp reddish yellow with segments 4 distally and 5 wholly blackish. Posterior part of propodeum entirely yellow. Hind coxa largely reddish yellow, blackish or brownish antero-ventrally and dorso-posteriorly. Hind femur reddish, sometimes with a blackish mark ventrally. Segments of gaster each black, reddish and yellow (from anterior to posterior), the area of black reduced or absent on posterior segments.

REMARKS. This is a distinctive species; its relationships are difficult to discern.

BIOLOGY AND HOSTS. Unknown. Dates of collection are in June and July.

DISTRIBUTION (Map 2, p. 16). The Szechuen province of China. Altitudes given on data labels range from 300–4500 m.

MATERIAL EXAMINED

Holotype ♂, **China:** Szechuen, Yao-Gi, 1200–2400 m, 3.vii.1929 (*Graham*) (USNM).

Paratypes 4 ♀, 10 ♂. **China:** 1 ♀, 2 ♂, Szechuen, Yao-Gi, 1200–2400 m, 3 & 16.vii.1929 (*Graham*) (USNM); 2 ♂, Szechuen, near Mupin, 600–2400 m, 28.vi & 22.vii.1929 (*Graham*) (USNM); 1 ♂, Szechuen, Ningyuenfu, 1800–3240 m, 24–26.vii.1928 (*Graham*) (USNM); 1 ♂, Szechuen, Mt Omei, 840 m, vi.1937 (*Graham*) (USNM); 1 ♂, Szechuen, Suifu, 300–450 m, 1–21.vi.1928 (*Graham*) (USNM); 2 ♂, Szechuen, 14.5 km SW. of Tatsienlu, 2550–3900 m, 25–27.vi.1923 (*Graham*) (USNM); 1 ♂, Szechuen, U Long Kong, near Tatsienlu, 3000–4500 m, 25–30.vi.1923 (*Graham*) (USNM); 2 ♀, Szechuen, Yachow, v–vi.1928 (*Graham*) (USNM); 1 ♀, Szechuen, Yachow to Mupin, 600–1500 m, 23–27.vi.1929 (*Graham*) (USNM).

***Banchus moppiti* sp. n.**

(Figs 22, 45, 70, 92, 113, 127)

DESCRIPTION. Female. Width of lower face 1.10–1.20 times vertical length of eye. Malar space 0.85–1.00 times basal width of mandible. Maxillary palp as in Fig. 22. Antenna with apical segments about as broad as long. Scutellar spine (Fig. 45) about 0.6 as long as scutellum, usually downcurved at the tip. Mesopleuron and mesoscutum coriaceous, usually strongly so, with strong punctures, on mesopleuron separated by much less than their diameter. Hind femur 4.75–5.20 times as long as deep. Fore wing length 8.2–10.8 mm. Tergite 1 of gaster 1.60–1.80 times as long as broad, its dorsal profile as in Fig. 70. Gaster compressed from

segment 4, reaching just beyond tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 92.

Colour: black and yellow. Face black with yellow orbital stripes, usually broad but varying considerably in width. Antenna black, usually with a small yellow patch on underside of scape. Maxillary palp blackish. Posterior part of propodeum black with a broad yellow stripe along posterior transverse carina. Hind coxa black, usually with a small yellow dorsal patch. Hind femur black, yellow proximally and distally and usually dorsally. Segments of gaster each black anteriorly, broadly yellow posteriorly.

Male. Width of lower face 1.10–1.20 times vertical length of eye. Malar space 0.75–0.95 times basal width of mandible. Maxillary palp as in Fig. 113; segment 4 flattened and widened; segment 5 not quite as long as 4. Antennal flag setae (Fig. 127) upright, relatively short, flattened and widened, 2 per segment, arising from a polished trough. Hind femur 4.80–5.50 times as long as deep. Fore wing length 8.5–10.9 mm. Tergite 1 of gaster 1.45–1.60 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating laterotergite.

Colour: black and yellow. Antenna black with scape and pedicel yellow ventrally. Maxillary palp blackish. Posterior part of propodeum yellow anteriorly, black posteriorly. Hind coxa black, usually with a yellow dorsal spot and sometimes also a postero-lateral one. Hind femur yellow with an extensive black mark, extending ventrally and laterally. Segments of gaster each black anteriorly, yellow posteriorly.

REMARKS. This species seems closely related to *zonatus*. Its generally much smaller size and relatively shorter appendages (and gaster in females) readily differentiate it.

BIOLOGY AND HOSTS. Unknown. The specimens were collected early in the year (in February, March and April) with the exception of a female taken in October.

DISTRIBUTION (Map 7, p. 29). The few known specimens come from widely scattered localities in western Europe.



Map 7 Distribution of *Banchus moppiti*.

MATERIAL EXAMINED

Holotype ♀, **Spain**: Madrid, Cercedilla, 22.x.1978 (*Noyes*) (BMNH).
 Paratypes 6 ♀, 4 ♂. **France**: 1 ♂, Vincennes, 20.ii.1885 (*de Gaulle* coll.) (MNHN); 1 ♂, Boulogne, 22.iii (*Giraud* coll.) (MNHN). **Great Britain**: 1 ♀ (*Desvignes* coll.) (BMNH). **Spain**: 4 ♀, 2 ♂, Teruel, 15.iii.82 (*Hiendlmayr* coll.) [note – only 1 ♀ of these 6 specimens has the locality and date but all are identically mounted and set] (ZSBS). **Switzerland**: 1 ♀, 7.iv.1861 (*Sichel* coll.) (MNHN).

Banchus nox Morley

(Figs 23, 46, 71, 93, 112)

Banchus nox Morley, 1913: 255. Holotype ♂, INDIA (BMNH) [examined].

NOMENCLATURE. The species misidentified as *nox* by Chandra & Gupta (1977: 182) is *B. punkettai*.

DESCRIPTION. Female. Width of lower face 0.80 times vertical length of eye. Malar space 0.55 times basal width of mandible. Maxillary palp as in Fig. 23. Antenna with apical segments longer than broad. Scutellar spine (Fig. 46) about 0.7 as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderate punctures, on mesopleuron separated by a little more than their diameter. Hind femur 6.40 times as long as deep. Fore wing length 11.2 mm. Tergite 1 of gaster 2.70 times as long as broad, its dorsal profile as in Fig. 71 (male). Gaster strongly compressed from posterior of segment 3, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 93.

Colour: black and reddish, with some yellow marks. Face black with very broad yellow orbital marks which also extend beneath antennal sockets. Antenna dark brown, blackish dorsally, scape and pedicel yellowish ventrally. Maxillary palp reddish yellow, with segment 1 dorsally and segment 4 distally blackish. Posterior part of propodeum blackish with an irregular reddish yellow band along posterior transverse carina. Hind coxa black with a large reddish dorsal patch. Hind femur reddish with a black stripe ventrally. Segments of gaster reddish, tergites 1, 2 and 3 black anteriorly.

Male. Width of lower face 0.85 times vertical length of eye. Malar space 0.50 times basal width of mandible. Maxillary palp as in Fig. 112; segment 4 flattened and considerably widened; segment 5 about 0.6 as long as 4. Antennal flag setae (similar to Fig. 126, but setae slightly longer) upright, long, flattened, 2 per segment, arising from a polished trough. Hind femur 6.05 times as long as deep. Fore wing length 9.7 mm. Tergite 1 of gaster 2.15 times as long as broad. Tergite 3 with a crease along its anterior 0.5 separating laterotergite.

Colour: black and yellow, with some reddish, especially on legs. Antenna black dorsally, scape and pedicel yellow ventrally, underside of flagellum with segment 1 and distal part reddish yellow, remainder black. Maxillary palp with segment 1 yellowish, 2 and 3 wholly and 4 proximally reddish yellow, 4 distally and 5 wholly brownish. Posterior part of propodeum yellow, narrowly black postero-medially. Hind coxa black, with a yellow dorsal spot contiguous interno-laterally with a postero-ventral spot. Hind femur reddish with a black mark ventrally. Segments of gaster each black anteriorly, yellow posteriorly, with junction of the two areas reddish.

REMARKS. Closely related to *flavomaculatus*. The aggregate differences between these taxa warrant their separation, but this will need to be reassessed when more material becomes available for study.

BIOLOGY AND HOSTS. The only two known specimens were collected in October and November, the male on flowers of *Spiraea* (Morley, 1913: 255).

DISTRIBUTION (Map 2, p. 16). Assam, between 1800 and 2400 m.

MATERIAL EXAMINED (1 ♀, 1 ♂)

India: 1 ♂, Assam, Shillong, Khasi Hills, 1800 m, x.1903 (*Turner*) (BMNH) (holotype); 1 ♀, Assam, Mishmi Hills, Delai Valley, Cha Che, 2200–2400 m, 21.xi.1936 (*Steele*) (BMNH).

Banchus palpalis Ruthe

(Figs 1, 24, 47, 72, 94, 114)

[*Banchus monileatus* Gravenhorst, 1829: 393; in part. Misidentification.]

Banchus palpalis Ruthe, 1859: 377. Syntypes 2 ♂, ICELAND (lost).

Banchus spinosus Cresson, 1865: 274. Holotype ♀ [not ♂ as stated by Cresson], U.S.A. (ANS) [not examined]. **Syn. n.**

Banchus formidabilis Provancher, 1874: 61. Holotype ♀, CANADA (UL) [not examined]. **Syn. n.**

Banchus (*Corynephanus*) *groenlandicus* Aurivillius, 1890: 30. Lectotype ♂, GREENLAND (NR), designated by Townes, 1961: 104 [examined]. **Syn. n.**
Cidaphurus alticola Ashmead, 1901: 148. Holotype ♀ [not ♂ as stated by Ashmead], U.S.A. (USNM) [not examined]. **Syn. n.**

NOMENCLATURE. For almost 150 years the name *monileatus* was applied consistently to this species. However, two species were mixed in Gravenhorst's original material and a series of unfortunate events culminated in Townes & Townes (1978: 532) designating as lectotype of *monileatus* a female which was *volutatorius*, rather than the species as it had been identified previously. In addition, as a result of misinformation about my examination of the holotype of *hastator*, Townes & Townes incorrectly synonymized *monileatus* with that species. Female *volutatorius* and *palpalis* superficially are strikingly similar, so much so that Aubert (1978: 156), without realising that he was examining *volutatorius*, commented that Townes' lectotype differed from *volutatorius* only in certain details! When he originally examined Gravenhorst's syntypes (in 1964) Townes probably checked the identity of the species and then made the mistake of selecting the specimen in best condition for designation as lectotype without re-checking it. Under the *International Code* the lectotype designation has priority over the previous restriction of the taxonomic species.

Thus *monileatus* becomes a junior synonym of *volutatorius* while the species previously known as *monileatus* must take the next available name – *palpalis*. The name *hastator* correctly applies to the species previously known by the junior synonym *femoralis*.

The identity of *palpalis* was established by Roman (1928: 24; 1930: 285) and Fitton (1978a: 76).

Banchus spinosus, *B. formidabilis* and *Cidaphurus alticola* are included in the synonymy of *palpalis* on the basis of their treatment in Townes & Townes (1978).

DESCRIPTION. Female. Width of lower face 0.80–0.90 times vertical length of eye. Malar space 0.65–0.75 times basal width of mandible. Maxillary palp as in Fig. 24. Antenna with apical segments longer than broad. Scutellar spine (Fig. 47) long, more than 0.8 as long as scutellum (in a very few specimens only 0.3 as long as scutellum). Mesopleuron and mesoscutum coriaceous, with fine to moderate punctures, on mesopleuron separated by a little more than their diameter. Hind femur 5.00–5.95 times as long as deep. Fore wing length 9.8–11.5 mm. Tergite 1 of gaster 1.65–2.15 times as long as broad, its dorsal profile as in Fig. 72 (male). Gaster compressed from posterior of segment 3, not quite reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 94.

Colour: almost entirely black except for mainly reddish legs and a few small yellowish marks. Face black with yellow orbital marks, usually very small and sometimes absent. Antenna black, entirely or with yellowish marks ventrally on scape and pedicel. Maxillary palp yellowish or brownish with segments 1 and 5 wholly and 3 and 4 distally blackish. Posterior part of propodeum entirely black. Hind coxa black. Hind femur reddish yellow, usually entirely, rarely darkened ventrally. Segments of gaster black, sternites and posterior edges of tergites 6 and 7 sometimes brownish.

Male (Fig. 1). Width of lower face 0.90–0.95 times vertical length of eye. Malar space 0.60–0.70 times basal width of mandible. Maxillary palp as in Fig. 114; segment 4 narrow and cylindrical, flattened and widened only at its extreme distal apex; segment 5 less than 0.2 as long as 4. Antennal flag setae (similar to Fig. 125, but setae slightly longer and showing signs of flattening) at about 50 degrees, very weakly flattened, 3 per segment, not arising from a trough. Hind femur 5.35–6.10 times as long as deep. Fore wing length 9.8–11.4 mm. Tergite 1 of gaster 1.90–2.25 times as long as broad. Tergite 3 with a crease along its anterior 0.5 separating laterotergite.

Colour: black, with some yellow and with legs mainly reddish yellow. Antenna black, scape and pedicel yellow ventrally, proximal and distal parts of flagellum often brownish yellow ventrally. Maxillary palp with segments 1 and 2 wholly and 3 and 4 proximally reddish yellow, 3 and 4 distally and 5 wholly blackish. Posterior part of propodeum usually entirely black, sometimes with a transverse yellow mark (or marks) immediately behind posterior transverse carina. Hind coxa sometimes entirely black, usually with an externo-lateral reddish yellow mark and sometimes also dorsal and/or ventral yellowish spots. Hind femur entirely reddish yellow. Segments of gaster black, sometimes brownish or yellowish on their posterior margins, very rarely with conspicuous yellow bands on tergites 1, 2 and 3.

REMARKS. Easily identified from the structure of the maxillary palps. Nonetheless, it is confused with female *volutatorius* by incompetent or overconfident identifiers. Its presumed sister-species is *crefeldensis*.

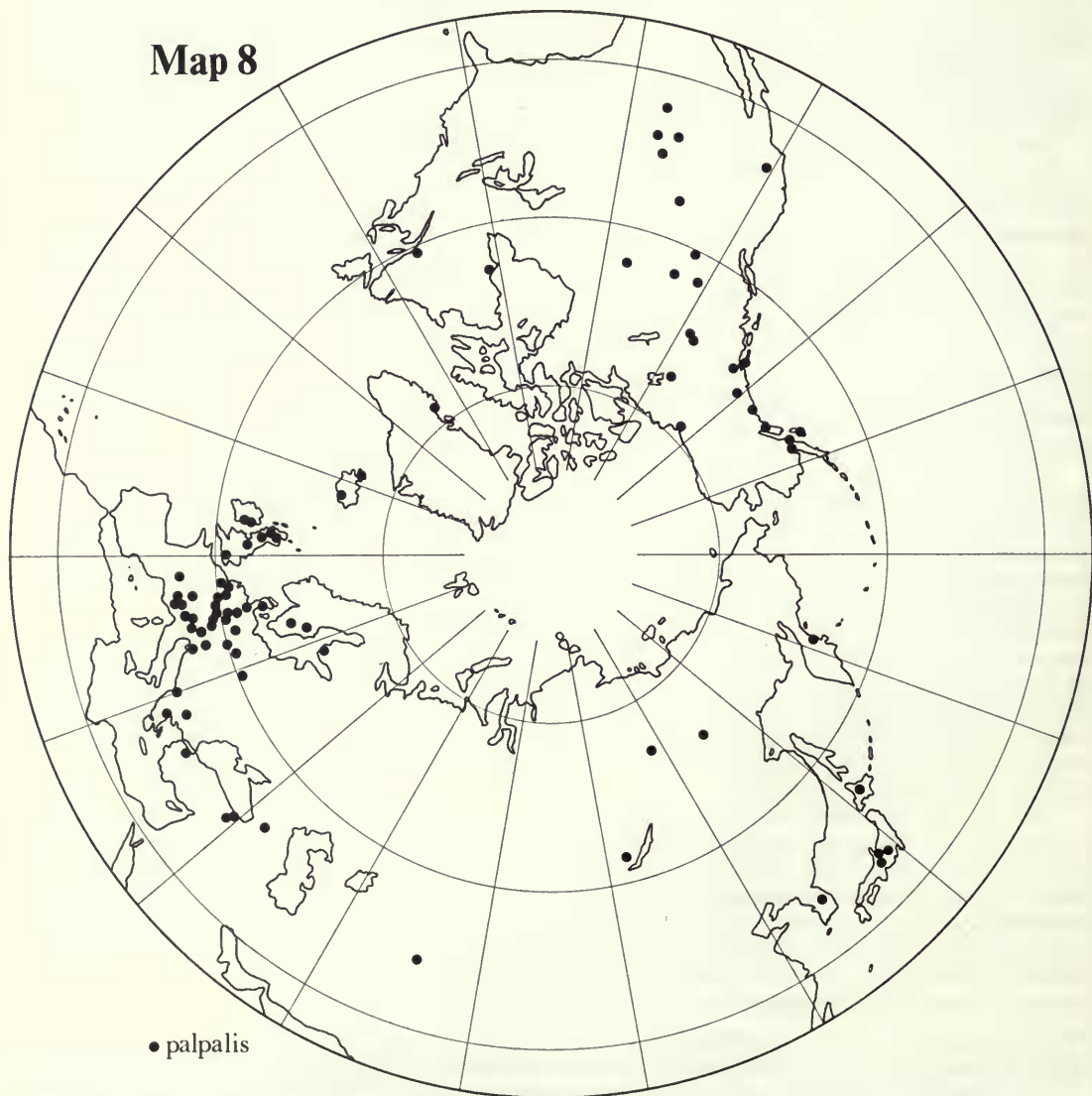
The males with well-developed yellow marking and conspicuous yellow bands on the gaster come mainly, but not exclusively, from the southern parts of the range. In North America, where the geographical variation in colour may be more consistent and also applies to females, this form has been recognized as a separate 'subspecies' (Townes & Townes, 1978: 533).

BIOLOGY AND HOSTS. Adults normally occur from mid-June to mid-August, with one record from Switzerland as early as 22 May and one from Yugoslavia as late as September. In Europe the usual host seems to be *Blepharita adusta* (Esper) (Noctuidae), from which I have seen 39 reared specimens. Of these, 34, possibly 35, come from a single mass rearing (with the only data: Germany (*Smits van Burgst* coll.) (LELW)). In Great Britain *Blepharita adusta* is more common in the north (Bretherton, Goater & Lorimer, 1983) and the records of *palpalis* show a similar pattern.

Hosts recorded in the literature are: *Panolis flammea* (Denis & Schiffermüller) (Noctuidae) (*Smits van Burgst*, 1927: 239), *Lacanobia oleracea* (Linnaeus) (Noctuidae) (Meyer, 1934: 231) and *Deilephila porcellus* (Linnaeus) (Sphingidae) (Leonardi, 1928: 87). The record from *L. oleracea*, at least, can probably be dismissed as having resulted from the misidentification of female *volutatorius*.

DISTRIBUTION (Map 8, p. 32). The only Holarctic species of *Banchus*. Very widely distributed; in the more southern parts of its range it occurs at higher altitudes (for example, altitudes of 1800 to 2100 m are recorded for the specimens from Austria, Yugoslavia, Bulgaria, Greece and Turkey).

Map 8



Map 8 Distribution of *Banchus palpalis* (the North American records are taken from Townes & Townes, 1978).

MATERIAL EXAMINED (103 ♀, 88 ♂)

Belgium, Bulgaria, Canada, Denmark, East Germany, Finland, France, Great Britain, Greece, Iceland, Ireland, Italy, Japan, Korea, Netherlands, Poland, Sweden, Switzerland, Turkey, West Germany, U.S.A., U.S.S.R., Yugoslavia (BC, BMNH, BRI, EIHU, FSA, HC, IEUB, IRSNB, IZPAN, JC, JKC, KC, LELW, MHN, MNHN, MNHU, MUM, NC, NR, RNH, USNM, UZM, VRC, ZC, ZI, ZMU, ZSBS).

Banchus pictus Fabricius

(Figs 25, 49, 50, 73, 95, 115)

Ichneumon cultratus Gmelin, 1790: 2708. Type(s) [?sex], EUROPE (destroyed). [Junior (by first reviser choice of Gravenhorst, 1829: 382, 1006) primary homonym of *Ichneumon cultratus* Gmelin, 1790: 2699.]

Ichneumon mutillatus Christ, 1791: 358. Type(s) ♂, no type-locality (lost). [Junior primary homonym of *Ichneumon mutillatus* Gmelin, 1790: 2716.]

Banchus pictus Fabricius, 1798: 234. Lectotype ♀, GERMANY (UZM), designated by Townes, Momoi & Townes, 1965: 238 [examined].

Banchus zagoriensis Hensch, 1928: 100. ?Syntypes 2 ♀, 1 ♂, YUGOSLAVIA (ZSBS) [examined].

Banchus bipunctatus Hensch, 1928: 101. Holotype ♂, YUGOSLAVIA (ZPZ) [examined].

Banchus russiator Aubert, 1978: 157. [Unavailable name published conditionally (Article 15 of the Code).]

Banchus russiator Aubert, 1981: 18. Holotype ♀, U.S.S.R. (AC) [examined]. **Syn. n.**

NOMENCLATURE. The synonymy of *I. cultratus* with *pictus* was queried by Aubert (1978: 157) but he gave no reasons for so doing and I can find none.

The description of *Ichneumon mutillatus* Christ fits well the male of *pictus* and the synonymy, proposed by Gravenhorst (1829: 383) but queried by Aubert (1978: 157), is accepted. The Christ name is unavailable because of its homonymy with *I. mutillatus* Gmelin, which is a replacement name for *I. mutillarius* Fabricius, 1787: 271 (a junior homonym of *I. mutillarius* Fabricius, 1775: 342).

I did not succeed in obtaining on loan material from the Hensch collection. However, Dr K. Horstmann was able to visit Zagreb in 1980 and in the course of his work on the species of Ichneumonidae described by Hensch he made the types of the *Banchus* species available to me. Unfortunately the specimen tentatively selected for designation as lectotype of *B. zagoriensis* had the date of collection 28 August 1928 and could not therefore have been a syntype as the description was published on 1 September 1928 (Horstmann, 1982a: 82). Three specimens labelled as cotypes (= syntypes) of *B. zagoriensis* are present in the Bauer collection (ZSBS). Because they bear no dates of collection and because the cotype labels were almost certainly added by Bauer and not Hensch (Horstmann, pers. comm.) they are only tentatively regarded as syntypes. Selection and designation of a lectotype for *B. zagoriensis* is best deferred until the other material in the Hensch collection can be examined. The identity of the species is not in doubt.

DESCRIPTION. Female. Width of lower face 0.80–0.95 times vertical length of eye. Malar space 0.40–0.50 times basal width of mandible. Maxillary palp as in Fig. 25. Antenna with apical segments slightly longer than broad. Scutellar spine (Figs 49, 50) ranging from very small to about 0.6 as long as scutellum. Mesopleuron and mesoscutum coriaceous, with strong punctures, on mesopleuron separated by less than their diameter. Hind femur 5.00–5.50 times as long as deep. Fore wing length 8.1–10.6 mm. Tergite 1 of gaster 1.45–1.65 times as long as broad, its dorsal profile as in Fig. 73. Gaster compressed, reaching just beyond tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.2 to 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 95.

Colour: black and yellow. Face yellow, with a black median stripe (rarely rather wide). Antenna with scape and pedicel black dorsally, yellow ventrally. Flagellum orange, sometimes slightly darker dorsally, almost always with segment 1 proximally blackish and distal segments dark. Maxillary palp reddish yellow, with segment 1 black and sometimes segments 2 proximally and 4 distally darkened. Posterior part of propodeum yellow anteriorly, black posteriorly; the yellow area varying considerably in extent, from covering almost all of the area to being divided by the black area medially, reduced to a pair of spots, or (very rarely) entirely absent. Hind coxa black, entirely or with a yellow dorsal patch. Hind femur medially black (sometimes brownish red, especially dorsally), yellow proximally and distally. Segments of gaster each black anteriorly, broadly yellow posteriorly.

Male. Width of lower face 0.85–1.00 times vertical length of eye. Malar space 0.45–0.55 times basal width of mandible. Maxillary palp as in Fig. 115; segment 4 moderately widened and flattened; segment 5 about 0.9 as long as 4. Antennal flag setae (similar to Fig. 125, but setae shorter) at about 60 degrees, short, not flattened, 2 per segment, not arising from a trough. Hind femur 5.05–5.65 times as long as deep. Fore wing length 8.1–10.3 mm. Tergite 1 of gaster 1.45–1.70 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating laterotergite.

Colour: black and yellow. Antenna with scape and pedicel black dorsally, yellow ventrally. Flagellum reddish orange, dorsally darker (blackish at base and apex). Maxillary palp blackish, sometimes entirely, but usually with segments 2 and 3 wholly and 4 and 5 proximally yellowish brown. Posterior part of propodeum black, entirely or with a pair of antero-lateral yellow patches (rarely the yellow more extensive, very rarely posterior part of propodeum entirely yellow). Hind coxa black, often with a dorsal yellow patch. Hind femur medially black (sometimes brownish red, especially dorsally), yellow proximally and distally. Segments of gaster each black anteriorly, broadly yellow posteriorly.

REMARKS. Specimens of *turcator* have been confused with *pictus*. The two species can be distinguished using the characters given in the key.

The morphospecies *pictus*, as here defined, has variations in time of occurrence of adults, length of the scutellar spine, and sex ratios which need further investigation and explanation.

There are two distinct periods of occurrence of adults. When this was noted 184 specimens were to hand. Of these 90 had a date of collection, 48 were captured between 10 April and 3 June and 42 between 1 July and 2 October (most of the latter batch after 10 August). The length of the scutellar spine varies from very small to about 0.6 as long as the scutellum. Although there is continuous variation in the length of the spine most of the specimens with a short spine were collected in the first period and most of those with a longer spine in the second. The sex ratio of the 48 specimens collected in the first period was 1.18 ♀: 1 ♂ and of the 42 in the second period 4.25 ♀: 1 ♂.

Three possible biological explanations of these observations are that (1) *pictus* is bivoltine, with the generations varying slightly in morphology and more distinctly in sex ratio; (2) the early and late summer groups represent separate species; or (3) that one species has a partial second generation and a second species (possibly parthenogenetic) occurs in late summer.

If two species were involved diligent study should have revealed variation in some morphological characters, colour, geographical distribution, or host or other biological data correlated with date of capture or length of scutellar spine. None was found. Assignment of the 94 specimens without a date of capture to two subjective classes – with short or long scutellar spine – gave groups which varied in sex ratio in the same way as the early and late summer groups (short spine, 58 specimens, 1.55 ♀: 1 ♂; long spine, 36 specimens, 5 ♀: 1 ♂). The only other relevant evidence comes from two reared specimens: two larvae of the noctuid *Agrochola helvola* (Linnaeus) collected near Sheffield, Great Britain (Ford) (UM) on 13 June 1969 proved to be parasitized. The parasite larvae emerged in August 1969 and spun cocoons. The resulting adults (1 ♀ 1 ♂) did not emerge until early May 1970.

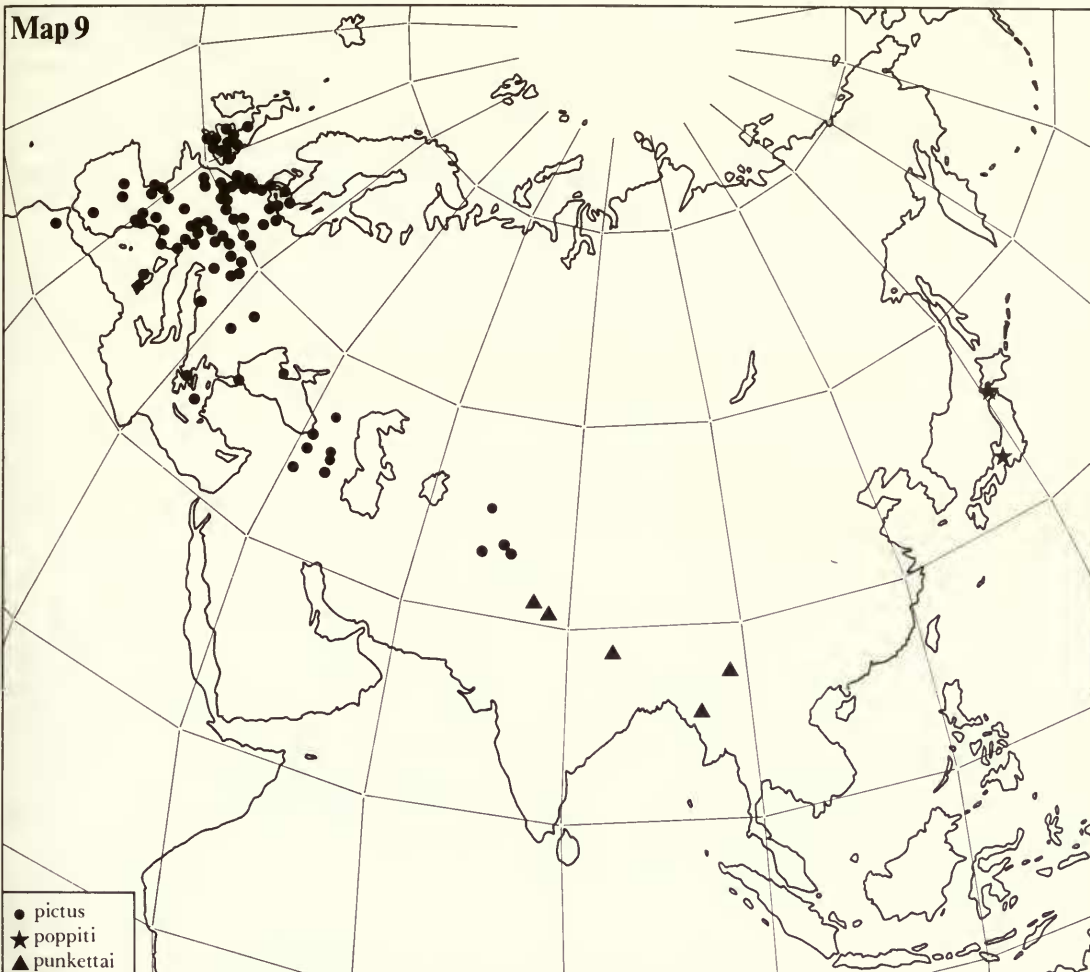
None of this evidence gives unambiguous support to any of the three suggested explanations of the observations. Even the one year life-cycle of the specimens reared in Sheffield could be explained by postulating univoltinism in the northern part of the range of the species and bivoltinism in the south (although no evidence of this was found). However, the balance is perhaps in favour of the involvement of more than one species, if only because there is no undisputed evidence of bivoltinism in any other species of *Banchus*. The poor quality and quantity of the available data and the possible complexity of the situation mean that the problem remains unresolved – a fruitful field for future study.

BIOLOGY AND HOSTS. For information on phenology see 'Remarks' above. I have seen only three reared specimens of *pictus*, from *Agrochola helvola* (Linnaeus) (Noctuidae) (all from Great Britain (Lyle and Ford) BMNH and UM). There are several hosts noted in the literature, but as black-and-yellow *Banchus* are frequently misidentified as *pictus* they should be treated with caution. The recorded hosts are: *Agrochola circellaris* (Hufnagel) (Noctuidae) (Habermehl, 1922: 269), *Agrotis segetum* (Denis & Schiffermüller) (Noctuidae) (Bajári, 1960: 261), *Atethmia ambusta* (Denis & Schiffermüller) (Noctuidae) (Schmiedeknecht, 1910: 1928), *Lycophotia porphyrea* (Denis & Schiffermüller) (Noctuidae) (de Gaulle, 1907: 119), *Hadena rivularis* (Fabricius) (Noctuidae) (Wagner, 1929: 11), *Phalera bucephala* (Linnaeus) (Notodontidae) (Leonardi, 1928: 83) and *Smerinthus ocellata* (Linnaeus) (Sphingidae) (Meyer, 1934: 228).

DISTRIBUTION (Map 9, p. 35). Widely distributed in the western Palaearctic as far north as 56°N in the west, and extending south-east as far as the Pamirs.

MATERIAL EXAMINED (162 ♀, 75 ♂).

Austria, Belgium, Czechoslovakia, Denmark, East Germany, France, Great Britain, Greece, Hungary, Italy, Morocco, Netherlands, Poland, Portugal, Rumania, Sardinia, Spain, Sweden, Switzerland, Turkey, U.S.S.R., West Germany, Yugoslavia (AC, BMNH, BRI, CM, FSA, HC, IBMPP, IEAU, IEE, IP, IRSNB, KHC, LELW, MCSN, MHN, MIZS, MLSU, MNHN, MUM, NM, NMB, NR, PC, RNH, RSM, TM, UM, USNM, UZI, UZM, VRC, ZC, ZIL, ZMU, ZSBS).



Map 9 Distribution of *Banchus pictus*, *B. poppiti* and *B. punkettai*.

***Banchus poppiti* sp. n.**

(Figs 26, 48, 74, 96, 116)

DESCRIPTION. Female. Width of lower face 0.90 times vertical length of eye. Malar space 0.55–0.65 times basal width of mandible. Maxillary palp as in Fig. 26. Antenna with apical segments longer than broad. Scutellar spine (Fig. 48) about 0.4 as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderate punctures, on mesopleuron separated by about their diameter. Hind femur 5.25–5.65 times as long as deep. Fore wing length 10.3–11.1 mm. Tergite 1 of gaster 1.65 times as long as broad, its dorsal profile as in Fig. 74 (male). Gaster very weakly compressed, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 96.

Colour: black and yellow, the margins of some yellow areas slightly reddish. Face black with yellow orbital stripes. Antenna with scape and pedicel black dorsally, yellow ventrally. Flagellum orange ventrally, dark dorsally. Maxillary palp yellowish with segments 1 dorsally, 4 distally, and 5 wholly dark. Posterior part of propodeum yellow, entirely or with posterior margin black. Hind coxa black with a large yellow dorsal patch. Hind femur black, narrowly reddish yellow proximally and distally. Segments of gaster black, narrowly yellow posteriorly.

Male. Width of lower face 0.95 times vertical length of eye. Malar space 0.50–0.65 times basal width of mandible. Maxillary palp as in Fig. 116; segment 4 flattened and widened; segment 5 about 0.5 as long as 4.

Antennal flag setae (similar to Fig. 127, but with setae narrower) upright, flattened, 2 per segment, arising from a polished trough. Hind femur 5.60–6.10 times as long as deep. Fore wing length 11.1–11.2 mm. Tergite 1 of gaster 1.65–1.90 times as long as broad. Tergite 3 with a crease along its anterior 0.4 separating laterotergite.

Colour: black and yellow, the margins of some yellow areas slightly reddish. Antenna black dorsally, yellow ventrally. Maxillary palp yellow with segments 4 distally and 5 wholly blackish. Posterior part of propodeum yellow, entirely or narrowly black postero-medially. Hind coxa black with very large dorsal and ventral yellow patches. Hind femur yellow, black-marked ventrally and internally, tending to reddish distally. Segments of gaster each black anteriorly, black posteriorly.

REMARKS. This species has not previously been differentiated from *japonicus*.

BIOLOGY AND HOSTS. Unknown. Adults have been collected in May and June.

DISTRIBUTION (Map 9, p. 35). Japan.

MATERIAL EXAMINED

Holotype ♂, **Japan**: Hakodate, 12.vi.1926 (*Malaise*) (NR).

Paratypes 2 ♀, 1 ♂. **Japan**: 1 ♀, 1 ♂, Hakodate, 12.vi.1926 (*Malaise*) (NR); 1 ♀, Mt Mino, 6.v.1929 (*Teranishi*) (TC).

Banchus punkettai sp. n.

(Figs 27, 51, 75, 97, 117)

[*Banchus nox* Morley; Chandra & Gupta, 1977: 182. Misidentification.]

DESCRIPTION. Female. Width of lower face 0.75–0.80 times vertical length of eye. Malar space 0.45–0.60 times basal width of mandible. Maxillary palp as in Fig. 27. Antenna with apical segments just broader than long. Scutellar spine (Fig. 51) about 0.5 as long as scutellum. Mesopleuron and mesoscutum shining, only very weakly sculptured, with strong punctures, on mesopleuron separated by less than their diameter. Hind femur 5.60–6.10 times as long as deep. Fore wing length 8.6–9.7 mm. Tergite 1 of gaster 1.80–2.25 times as long as broad, its dorsal profile as in Fig. 75. Gaster strongly compressed from posterior of segment 3, reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 97.

Colour: black and yellow, with some reddish, especially on legs. Face yellow with a black median stripe, the stripe sometimes rather wide but with reddish yellow patches remaining below antennal sockets. Antenna brown, often rather darker dorsally and distally, with scape and pedicel blackish dorsally and yellowish ventrally. Maxillary palp reddish yellow with distal parts of segments 4 and 5 dark. Posterior part of propodeum yellowish with a black patch medio-posteriorly, the yellow area sometimes reduced to a band along posterior transverse carina. Hind coxa black with a yellow dorsal patch and a red postero-ventral patch. Hind femur reddish with a blackish ventral stripe. Segments of gaster each black anteriorly, yellow posteriorly, with junction between two colours reddish. Tergite 1 also with posterior margin black and yellow area reduced to two lateral and/or one median spot(s).

Male. Width of lower face 0.90 times vertical length of eye. Malar space 0.65 times basal width of mandible. Maxillary palp as in Fig. 117; segment 4 flattened and considerably widened; segment 5 about 0.6 as long as 4. Antennal flag setae (similar to Fig. 124) relatively poorly differentiated, at about 50 degrees, very short, not flattened, 2 per segment, without a polished trough. Hind femur 6.05 times as long as deep. Fore wing length 8.6 mm. Tergite 1 of gaster 1.90 times as long as broad. Tergite 3 with a crease along its anterior 0.5 separating laterotergite.

Colour: black and yellow, with some reddish, especially on legs. Antenna black dorsally, scape, pedicel and proximal flagellar segments yellow ventrally, remainder of flagellum brownish yellow ventrally. Maxillary palp with segment 1 yellow, 2 and 3 reddish yellow, 4 and 5 blackish. Posterior part of propodeum yellow, black postero-medially. Hind coxa black, with a dorsal yellow spot which is contiguous interno-laterally with a postero-ventral spot. Hind femur reddish, black ventrally and with a separate dorsal blackish area. Segments of gaster each black anteriorly, yellow posteriorly, the junction between the two colours very narrowly reddish.

REMARKS. The colour pattern of this species is very similar to two other species, *flavomaculatus* and *nox*, found in the same area. The males are easily identified using the flag setae but the females are more difficult to separate.

BIOLOGY AND HOSTS. Virtually unknown. Adults have been collected in April and May. The specimens collected by Kamath and Gupta came from mixed vegetation in coniferous forest (Gupta, 1975: (appendix 20, 22).

DISTRIBUTION (Map 9, p. 35). Along the southern flank of the Himalayas and south-east into Burma, between about 2000 and 3000 m.

MATERIAL EXAMINED

Holotype ♂, **Nepal**: 27°56'N, 85°00'E, 3030 m, 23–29.v.1967 (*Can. Nepal Exped.*) (BRI).

Paratypes 13 ♀. **Burma**: 5 ♀, NE., Kambaiti, 2000 m, 4, 6 & 7.iv.1934 (*Malaise*) (NR); 1 ♀, Mt Victoria, 2800 m, 27.iv.1938 (*Heinrich*) (TC). **India**: 1 ♀, Himachal Pradesh, Dalhousie, 2132 m, 29.iv.1971 (*Ram*) (GC); 1 ♀, Himachal Pradesh, Kalatop, 2438 m, 8.v.1971 (*Kamath*) (GC); 1 ♀, Himachal Pradesh, Simla (*Nurse*) (BMNH) (paralectotype of *Cidaphurus flavomaculatus* Cameron). **Nepal**: 2 ♀, 27°56'N, 85°00'E, 3030 m, 23–29.v.1967 (*Can. Nepal Exped.*) (BRI); 2 ♀, 28°00'N, 85°00'E, 21–23.v.1967 (*Can. Nepal Exped.*) (BRI).

***Banchus sanjozanus* Uchida**

(Figs 52, 76, 118)

Banchus volutatorius var. *sanjozanus* Uchida, 1929: 184. Holotype ♂, JAPAN (EIHU) [examined].

DESCRIPTION. Female. See 'Remarks'.

Male. Width of lower face 0.86 times vertical length of eye. Malar space 0.50–0.60 times basal width of mandible. Maxillary palp as in Fig. 118; segment 4 flattened and considerably widened; segment 5 about 0.6 as long as 4. Antennal flag setae (similar to Fig. 128) upright, long, flattened, 2 per segment, arising from a polished trough. Scutellar spine (Fig. 52) about as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderately fine punctures, on mesopleuron separated by a little more than their diameter. Hind femur 5.15–5.60 times as long as deep. Fore wing length 10.2–10.4 mm. Tergite 1 of gaster 2.10–2.22 times as long as broad, its dorsal profile as in Fig. 76. Tergite 3 with a crease along its anterior 0.4 separating laterotergite.

Colour: black and reddish, with some yellow. Face entirely reddish yellow or yellow with a narrow median black stripe. Antenna with scape and pedicel blackish dorsally, yellow or reddish yellow ventrally. Flagellum reddish, darkened dorsally, especially first few segments and distal 0.3. Maxillary palp with segments 1, 2 and 3 reddish yellow, 4 and 5 blackish. Posterior part of propodeum reddish, entirely or with posterior margin narrowly black. Hind coxa blackish with a large (but not sharply defined) reddish dorsal patch and at least some reddish ventrally. Hind femur reddish with a blackish ventral mark. Segments of gaster each reddish, with some blackish anteriorly, especially on tergites 1 and 2.

REMARKS. Closely related to *volutatorius*. I have seen no females which I can associate with the males, although females were recorded by Uchida (1931: 52).

BIOLOGY AND HOSTS. Unknown. Adults have been collected in August.

DISTRIBUTION (Map 2, p. 16). Japan.

MATERIAL EXAMINED (2 ♂)

Japan: 1 ♂, Sanjodake, Yamato, 9.viii.1913 (*Isshiki*) (EIHU) (holotype); 1 ♂, Hokkaido, Mt Yubari, 11.viii.1966 (*Kusigemati*) (KC).

***Banchus tholus* sp. n.**

(Figs 28, 53, 77, 98, 119)

DESCRIPTION. Female. Width of lower face 0.70–0.80 times vertical length of eye. Malar space 0.65–0.85 times basal width of mandible. Maxillary palp as in Fig. 28. Antenna with apical segments longer than broad. Scutellar spine (Fig. 53) about as long as scutellum. Mesopleuron shining, very weakly sculptured, with moderate punctures, separated by more than their diameter. Hind femur 6.60–7.05 times as long as deep. Fore wing length 10.8–12.2 mm. Tergite 1 of gaster 1.90–2.20 times as long as broad, its dorsal profile as in Fig. 77. Gaster subcylindrical, only weakly compressed apically, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its whole length separating laterotergite. Tergite 7 and sternite 6 as in Fig. 98.

Colour: variable, from brown and yellowish cream to largely reddish orange (see 'Remarks' below). Face yellowish to reddish orange with orbits yellow. Antenna blackish, with scape, pedicel, and sometimes base of flagellum, yellowish or reddish ventrally. Maxillary palp entirely reddish yellow. Posterior part of

propodeum pale yellow cream with a postero-median brown area or entirely reddish. Hind coxa yellowish cream and brown or entirely reddish. Hind femur entirely reddish. Segments of gaster reddish with segment 1 pale cream or yellowish anteriorly, and sometimes with segments 1 to 4 each with a dark brownish transverse median band.

Male. Width of lower face 0.80 times vertical length of eye. Malar space 0.70 times basal width of mandible. Maxillary palp as in Fig. 119; segment 4 moderately widened and flattened; segment 5 about as long as 4. Antennal flag setae not differentiated (antennae in poor condition and proper observation difficult). Hind femur 7.15 times as long as deep. Fore wing length 11.5 mm. Tergite 1 of gaster 1.60 times as long as broad. Tergite 3 with a crease along its whole length separating laterotergite.

Colour: brown and yellowish cream, with some reddish. Antenna brownish dorsally, brownish yellow ventrally. Maxillary palp entirely reddish yellow. Posterior part of propodeum reddish yellow, narrowly dark brownish postero-medially. Hind coxa yellowish cream and brown. Hind femur entirely reddish. Segments of gaster reddish, with segment 1 pale creamy yellow anteriorly and 1 and 2 more or less brownish medially.

REMARKS. The females show a considerable range of variation in colour, the specimens from Burma resembling those of *tumidus*, while those from the Philippines are almost entirely reddish orange. The specimens from Sumatra and Java have an intermediate coloration. Unfortunately only a single male (from Burma) is known. The females might represent more than one species. See also 'Remarks' under *B. tumidus*.

BIOLOGY AND HOSTS. Virtually unknown. Adults have been collected in December, March, April, May and June. The specimen from Mount Data was collected in oak forest.

DISTRIBUTION (Map 2, p. 16). On mountains in Burma, Sumatra, Java and the Philippines.

MATERIAL EXAMINED

Holotype ♂, **Burma**: NE., Kambaiti, 1800 m, 11.vi.1934 (*Malaise*) (NR).

Paratypes 10 ♀. **Burma**: 1 ♀, Mt Victoria, 1400 m, iii.1938 (*Heinrich*) (GC) (paratype of *Banchus tumidus* Chandra & Gupta); 2 ♀, Maymyo, 800 m, xii.1937 (*Heinrich*) (TC) (paratypes of *Banchus tumidus* Chandra & Gupta). **Sumatra**: 1 ♀, Sungei Kumbang, Korinchi, 1370 m, iv.1914 (*Robinson & Klass*) (BMNH). **Java**: 1 ♀, Gedeh, Tjibodas, 1700 m, xii.1935 (*Lieftinck*) (TC). **Philippines**: 4 ♀, Mindoro, Ilong, Mt Halcon, 1370 m, 9, 10 & 11.v.1954 (*Townes*) (TC); 1 ♀, Mt Data, 2380 m, 31.xii.1952 (*Townes*) (TC).

Banchus tumidus Chandra & Gupta

(Figs 29, 54, 78, 99, 120)

Banchus tumidus Chandra & Gupta, 1977: 183. Holotype ♀, INDIA (GC) [examined].

DESCRIPTION. Female. Width of lower face 0.75–0.80 times vertical length of eye. Malar space 0.65–0.75 times basal width of mandible. Maxillary palp as in Fig. 29. Antenna with apical segments longer than broad. Scutellar spine (Fig. 54) about as long as scutellum. Mesopleuron shining, only very weakly sculptured, with moderate punctures, separated by more than their diameter. Hind femur 6.80–7.05 times as long as deep. Fore wing length 10.5–11.9 mm. Tergite 1 of gaster 1.85–1.95 times as long as broad, its dorsal profile as in Fig. 78. Gaster subcylindrical, only weakly compressed posteriorly, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its whole length separating laterotergite. Tergite 7 and sternite 6 as in Fig. 99.

Colour: yellowish cream, reddish and brown. Face yellowish. Antenna dark brown, with scape, pedicel and base of flagellum yellowish ventrally. Maxillary palp entirely reddish yellow. Posterior part of propodeum yellowish cream with a postero-median brown area. Hind coxa yellowish cream and brown. Hind femur entirely reddish. Segments of gaster reddish yellow, with segment 1 pale anteriorly and segments 1 to 4 each with a brownish transverse median band.

Male. Width of lower face 0.80–0.85 times vertical length of eye. Malar space 0.60–0.70 times basal width of mandible. Maxillary palp as in Fig. 120; segment 4 very considerably widened and flattened; segment 5 about 0.76 as long as 4. Antennal flag setae not differentiated. Hind femur 6.70–6.90 times as long as deep. Fore wing length 10.8 mm. Tergite 1 of gaster 1.70–1.75 times as long as broad. Tergite 3 with a crease along its whole length separating laterotergite.

Colour: creamy yellow and brown. Antenna dark brown dorsally, yellow ventrally. Maxillary palp reddish yellow with segment 4 partly blackish (Fig. 120). Posterior part of propodeum reddish yellow, brownish postero-medially. Hind coxa creamy yellow and brown. Hind femur entirely reddish. Segments of gaster reddish yellow, with segment 1 pale cream anteriorly and 1 and 2 brownish medially.

REMARKS. This species is very closely related to *tholus*. The males are easily distinguished on the form of the maxillary palp, but not otherwise. The females are impossible to separate on morphological characters; those placed here as *tumidus* have segment 4 of the maxillary palp very weakly bicoloured (it is strongly bicoloured in males). The females of *tholus* show a much wider range of variation in colour and the division between the two species was made largely on the basis of geography. See also 'Remarks' under *tholus*.

BIOLOGY AND HOSTS. Virtually unknown. Adults have been collected in April, May, June, September and November.

DISTRIBUTION (Map 2, p. 16). On the southern flank of the western Himalayas between 600 and 2000 m.

MATERIAL EXAMINED (9 ♀, 2 ♂)

India: 1 ♀, Uttar Pradesh, Kumaon Himalaya, Jeolikote, 1219 m, 12.ix.1965 (*Tikar*) (GC) (holotype); 1 ♀, Himachal Pradesh, Khajjiar, 1920 m, 24.vi.1965 (*Joseph*) (GC); 1 ♀, Himachal Pradesh, Khajjiar, 1828 m, 30.iv.1971 (*Ram*) (GC); 2 ♀, Himachal Pradesh, Manali, 1828 m, 17 & 20.v.1970 (*Ram & Gulati*) (GC); 1 ♀, Uttar Pradesh, 1949 (*Bianchi*) (TC); 2 ♀, Uttar Pradesh, Dehra Dun, 600 m, 27.xi.1965 (*Gupta*) (GC); 1 ♂, Uttar Pradesh, Kumaon Hills, Bhowali, 1700 m, 5-8.vi.1968 (*Gupta*) (GC); 1 ♂, Uttar Pradesh, Dehra Dun, 7.iv.1967 (*Tikar*) (GC); 1 ♀, Uttar Pradesh, Gharwal Himalaya, Phata, 1524 m, 12.v.1967 (*Kamath*) (GC).

Banchus turcator Aubert

(Figs. 30, 55, 79, 100, 121)

Banchus turcator Aubert, 1978: 157. [Unavailable name published conditionally (Article 15 of the Code).]
Banchus turcator Aubert, 1981: 18. Holotype ♂, TURKEY (AC) [examined].

DESCRIPTION. Female. Width of lower face 0.90-1.00 times vertical length of eye. Malar space 0.50-0.55 times basal width of mandible. Maxillary palp as in Fig. 30. Antenna with apical segments longer than broad. Scutellar spine (Fig. 55) usually very small, sometimes absent or reasonably well developed. Mesopleuron and mesoscutum strongly coriaceous, with moderate to strong punctures, on mesopleuron separated by slightly less than their diameter. Hind femur 4.70-5.60 times as long as deep. Fore wing length 8.0-10.7 mm. Tergite 1 of gaster 1.45-1.90 times as long as broad, its dorsal profile as in Fig. 79. Gaster relatively weakly compressed, reaching about to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.3 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 100.

Colour: mainly black and yellow, the yellow areas on the appendages tending to reddish. Face varying from yellow with a black median stripe to black with yellow orbital stripes. Antenna with scape and pedicel black dorsally, yellow ventrally. Flagellum entirely orange except that it is dark at extreme apex. Maxillary palp reddish yellow, with segments 1 and 5 wholly, 2 proximally and 4 distally dark. Posterior part of propodeum black with a yellow band (sometimes interrupted medially) along posterior transverse carina. Hind coxa black, entirely or with a yellow dorsal patch. Hind femur black, yellow or reddish yellow proximally and distally, the yellowish area sometimes extending along most of dorsal surface. Segments of gaster each black anteriorly, yellow (sometimes broadly so) posteriorly.

Male. Width of lower face 0.90-1.05 times vertical length of eye. Malar space 0.45-0.55 times basal width of mandible. Maxillary palp as in Fig. 121; segment 4 flattened and considerably widened; segment 5 about as long as 4. Antennal flag setae (similar to Fig. 127, but setae more widened toward their apices) upright, flattened and widened, 2 per segment, arising from a polished trough. Hind femur 4.60-5.30 times as long as deep. Fore wing length 8.7-10.0 mm. Tergite 1 of gaster 1.55-1.65 times as long as broad. Tergite 3 with a crease along its anterior 0.3 separating laterotergite.

Colour: black and yellow, with some reddish. Antenna with scape and pedicel black dorsally, yellow ventrally. Flagellum orange, darkened distally. Maxillary palp with segment 1 yellowish (sometimes partly darkened), 2 and 3 wholly and 4 proximally reddish yellow, 4 distally and 5 wholly blackish or brownish. Posterior part of propodeum black with a yellow band along posterior transverse carina, the band sometimes broken medially, reduced to two lateral spots or even absent. Hind coxa black, usually with a ventral and sometimes also a dorsal yellow spot. Hind femur yellowish red with a large medial black area. Segments of gaster each black anteriorly, yellow posteriorly.

REMARKS. This species has been confused with *pictus* in collections. It is, however, quite unrelated as shown, for instance, by the rather different flag setae.

BIOLOGY AND HOSTS. Unknown. Adults have been collected in April, May and June.

DISTRIBUTION (Map 4, p. 20). Turkey and in the mountains of Tadzhikistan.

MATERIAL EXAMINED (5 ♀, 9 ♂)

Turkey: 1 ♂, Gürün, 12–15.vi.1976 (*Heinrich*) (AC) (holotype); 1 ♀, Alem-Dağ, 600 m, 26–30.vi., (*Demelt*) (FSA); 1 ♂, Antalya, Termessus, 9.v.1968 (*Hallin*) (NR); 1 ♀, Erzurum, 20 km İspir to İkizdere rd, 1700 m, 2.vi.1962 (*Guichard & Harvey*) (BMNH); 1 ♂, Gümüşane, near Maden, 1800 m, 29.v.1962 (*Guichard & Harvey*) (BMNH); 1 ♀, Isik-Dağ, 1200 m, vi.1966 (*Ressler*) (FSA); 1 ♀, Istanbul, 20.iv. (*de Gaulle* coll.) (MNHN); 1 ♂, Kızılcahamam, 1000 m, 26–28.v.1964 (FSA); 1 ♀, 1 ♂, Nevşehir, Urgüp, 4 & 6.vi.1978 (*Schwarz*) (AC); 1 ♂, Zara Taiger (UZM). U.S.S.R.: 2 ♂, Gissarskiy Khrebet, K-K chanch-ov on Aliche, 25.iv.1960 (*Malyavin*) (MLSU); 1 ♂, Khorog region, Shugnansk Khrebet, 2600 m, 5.vi.1956 (*Zhelokhovtsev*) (MLSU).

Banchus volutatorius (Linnaeus)

(Figs 3, 7, 8, 31, 56, 80, 101, 122, 128)

Ichneumon volutatorius Linnaeus, 1758: 562. Lectotype ♂, EUROPE (LSL), fixed by Roman, 1932: 14 [examined].

Ichneumon venator Linnaeus, 1758: 564. Type(s) ♀, EUROPE (lost).

Ichneumon umbellatarum Schrank, 1786: 261. Type(s) ♀ [not ♂ as stated by Schrank], WEST GERMANY (lost). **Syn. n.**

Ichneumon certator Thunberg, 1822: 266; 1824: 322. Holotype ♀, SWEDEN (UU) [not examined].

Banchus monileatus Gravenhorst, 1829: 393. Lectotype ♀, POLAND (ZI), designated by Townes & Townes, 1978: 532 [examined]. **Syn. n.**

Banchus farrani Curtis, 1836: 588. Lectotype ♂, IRELAND (NMV), designated by Fitton, 1976: 322 [examined].

Banchus falcatorius Szépligeti, 1910: 186. Holotype ♀, HUNGARY (TM) [examined].

Banchus volutatorius var. *alticola* Schmiedeknecht, 1910: 1931. Syntypes ♀, ♂, EAST GERMANY (?MNHU) [not examined]. [Junior secondary homonym of *Cidaphurus alticola* Ashmead, 1901: 148.]

Banchus obscurus Meyer, 1926: 263. Type(s) ♀ [not ♂ as stated by Meyer], U.S.S.R. (destroyed).

NOMENCLATURE. The identity of *venator* was established by Fitton (1978b: 375).

Gravenhorst (1829: 389) synonymised *I. umbellatarum* with *B. falcatorius* but subsequently it has been included in the synonymy of *B. compressus* (= *dilatatorius*) (e.g. Aubert, 1978: 152 [with the date given incorrectly as 1802]) without, however, being used as the valid name for that species, despite its seniority. The description does not fit *dilatatorius*; it could apply to some females of *falcatorius* or *volutatorius*. I consider that it best fits certain females of *volutatorius*, with which it is here synonymised.

Although the types of var. *alticola* were not located a male determined by Schmiedeknecht, and from the type-locality, was examined (ZSBS).

Meyer undoubtedly mistook the sex of the type-material (probably a single specimen) of *obscurus* because the face coloration cannot apply to any male *Banchus*. The description fits perfectly the female of *volutatorius* and the host recorded by Meyer (*Lacanobia oleracea*) is one of those known for this species.

DESCRIPTION. Female. Width of lower face 0.85–0.90 times vertical length of eye (Fig. 3). Malar space 0.55–0.60 times basal width of mandible. Maxillary palp as in Fig. 31. Antenna with apical segments longer than broad. Scutellar spine (Fig. 56) distinct, often almost 0.5 as long as scutellum. Mesopleuron and mesoscutum coriaceous, with moderate punctures, on mesopleuron separated by about their diameter. Hind femur 4.85–5.35 times as long as deep. Fore wing length 8.1–9.8 mm. Tergite 1 of gaster 1.80–2.05 times as long as broad, its dorsal profile as in Fig. 80. Gaster (Figs 7, 8) moderately compressed, not reaching to tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 101.

Colour: predominantly black, with legs largely reddish. Face black, occasionally with brownish orbital marks. Antenna black, with scape, pedicel and proximal flagellar segments reddish brown ventrally. Maxillary palp black, with segments 2 and 3 wholly and 4 proximally reddish or brownish. Posterior part of propodeum black, often entirely, sometimes with reddish areas (of varying extent) on segments 1, 2 and 3 (in extreme cases with posterior margins of these segments narrowly yellowish).

Male. Width of lower face 0.90–1.00 times vertical length of eye. Malar space 0.45–0.60 times basal width of mandible. Maxillary palp as in Fig. 122; segment 4 considerably widened and flattened; segment 5 about 0.5 as long as 4. Antennal flag setae (Fig. 128) upright, very long, flattened and widened, 2 per segment, arising from a polished trough. Hind femur 4.85–5.40 times as long as deep. Fore wing length 8.0–9.9 mm. Tergite 1 of gaster 1.65–2.00 times as long as broad. Tergite 3 with a crease along its anterior 0.4 separating laterotergite.

Colour: black and yellow, with some reddish. Antenna black with flagellum yellowish ventrally except at

its distal apex. Maxillary palp with segment 1 yellow, 2 and 3 wholly and 4 proximally reddish yellow, 4 distally and 5 wholly blackish. Posterior part of propodeum black or with a yellow mark or marks along (usually just anterior to) posterior transverse carina. Hind coxa black, entirely or with small yellow marks externo-laterally and/or postero-ventrally. Hind femur reddish yellow, rarely with a blackish ventral mark. Segments of gaster each black anteriorly, yellow posteriorly, tergites 1, 2 and 3 very broadly yellow and with anterior area often partly (sometimes largely) reddish.

REMARKS. The male is similar, superficially, to *falcatorius* but can be separated readily by the number of flag setae and the lack (usually) in *falcatorius* of a distinct spine on the scutellum. The female has a gaster which is quite unlike that of *falcatorius* and would not be confused with it. The female is, however, frequently confused with *palpalis*, although the maxillary palp is different in form and *volutatorius* generally has a much shorter scutellar spine.

BIOLOGY AND HOSTS. Adults have been collected mainly in the period from mid-June to early August, but there are a few records as early as mid-April and as late as September. However, there is no evidence of two generations in the distribution of the records and information from rearings also indicates that *volutatorius* is univoltine. I have seen 58 reared specimens, many with detailed and reliable host data. The hosts (in decreasing order of number of rearings and reared specimens) are: *Anarta myrtilli* (Linnaeus) (Noctuidae), 12 ♀, 11 ♂ from 12 rearings, Great Britain, Germany, the Netherlands and Switzerland; *Lacanobia oleracea* (Linnaeus) (Noctuidae), 14 ♀, 1 ♂ from 5 rearings, Great Britain; *Mamestra brassicae* (Linnaeus) (Noctuidae), 1 ♀, 1 ♂ from 2 rearings, Great Britain; *Hadena compta* (Denis & Schiffermüller) (Noctuidae), 3 ♀, 1 ♂ from 1 rearing, Denmark; *Ceramica pisi* (Linnaeus) (Noctuidae), 1 ♀, 1 ♂ from 1 rearing, Great Britain; *Heliothis virescens* (Hufnagel) (Noctuidae), 2 ♂ from 1 rearing, Germany; *Xestia xanthographa* (Denis & Schiffermüller) (Noctuidae), 1 ♂ from 1 rearing, Great Britain; *Habrosyne pyritoides* (Hufnagel) (Thyrididae), 1 ♀ from 1 rearing, Germany; *Opisthograptis luteolata* (Linnaeus) (Geometridae), 1 ♀ from 1 rearing, Germany; and *Zygaena ephialtes* (Linnaeus) (Zygaenidae), 1 ♂ from 1 rearing, Germany.

The literature additionally records these noctuid hosts: *Agrotis segetum* (Denis & Schiffermüller) (Meyer, 1927a: 81), *Lycophotia porphyrea* (Denis & Schiffermüller) (Leonardi, 1928: 83; Meyer, 1934: 231); *Lacanobia suasa* (Denis & Schiffermüller) and *L. contigua* (Denis & Schiffermüller) (Ljungdhal, 1918: 82; Meyer, 1934: 231); and *Bena prasinana* (Linnaeus) (Hedwig, 1939: 22). Zorin & Zorina (1929) give some biological information on the association with *Lacanobia oleracea*.

DISTRIBUTION (Map 10, p. 42). Widespread in northern and central Europe, extending into Turkey, and in the U.S.S.R. occurring as far south as Alma-Ata and as far east as the Chitinskaya Oblast.

MATERIAL EXAMINED (486 ♀, 301 ♂)

Austria, Belgium, Denmark, East Germany, Finland, France, Great Britain, Hungary, Ireland, Netherlands, Norway, Poland, Rumania, Sweden, Switzerland, Turkey, U.S.S.R., West Germany (AC, BC, BMNH, BRI, CM, FSA, HC, IBMPP, IEUB, IP, ITZ, IZPAN, JC, KHC, LELW, MHN, MLSU, MNHN, MUM, NMB, NR, PC, RNH, RSM, TM, UM, USNM, UZI, UZM, VRC, ZC, ZI, ZIL, ZIM, ZMU, ZSBS).

Banchus zonatus Rudow

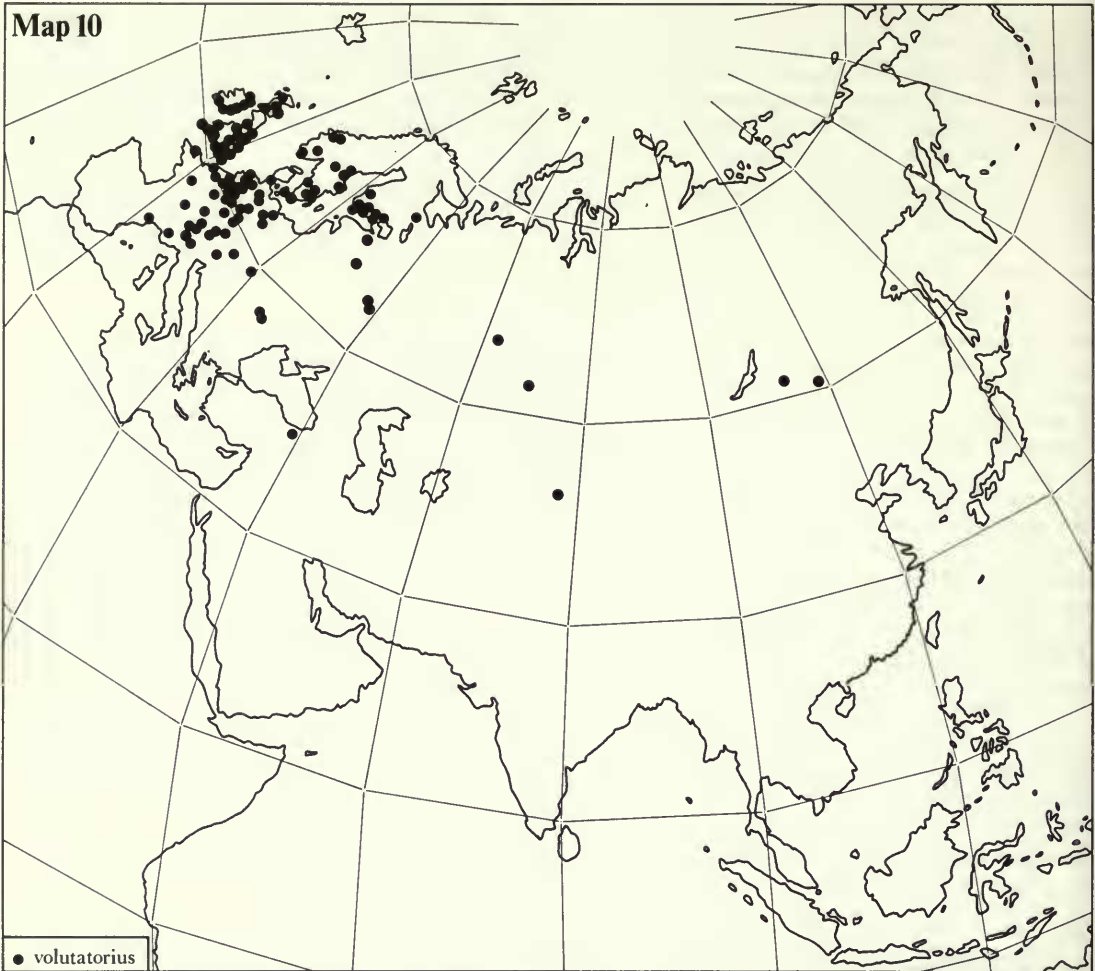
(Figs 32, 57, 58, 81, 102, 123, 126)

Banchus zonatus Rudow, 1883a: 57. Type(s) ♀, EUROPE 'Sudeuropa' (?JPM) [not examined].

Banchus algericus Schmiedeknecht, 1910: 1927. Holotype ♀, ALGERIA (MNHU) [examined]. **Syn. n.**

NOMENCLATURE. Apart from some exaggeration of size, the description of *zonatus* fits perfectly, and only, the female of this species. The synonymy is further confirmed by the type-locality 'Vaterland Sudeuropa' (the species was not described from Germany as stated by Aubert, 1978: 166). It has not been possible to obtain on loan material from the Rudow collection. Rudow's methods and the poor condition of his collection were criticized during his lifetime. The collection, still neglected, was seen recently by Horstmann (pers. comm.), who made notes on its contents, including the fact that three specimens stand as *B. zonatus*. However, nothing is known of the status or identity of these specimens.

DESCRIPTION. Female. Width of lower face 1.00–1.15 times vertical length of eye. Malar space 0.75–0.95 times basal width of mandible. Maxillary palp as in Fig. 32. Antenna with apical segments broader than long. Scutellar spine (Figs 57, 58) about 0.5 as long as scutellum or almost absent (see 'Remarks'). Mesopleuron and mesoscutum coriaceous with moderately strong punctures, on mesopleuron separated by less than their diameter. Hind femur 5.30–6.15 times as long as deep. Fore wing length 11.1–13.5 mm.



Map 10 Distribution of *Banchus volutatorius*.

Tergite 1 of gaster 1.35–1.65 times as long as broad, its dorsal profile as in Fig. 81. Gaster strongly compressed from posterior part of segment 3, reaching beyond tips of fore wings (when folded back). Tergite 3 with a crease along its anterior 0.4 separating laterotergite. Tergite 7 and sternite 6 as in Fig. 102.

Colour: black and yellow. Face yellow with a black median stripe. Antenna black (sometimes brownish distally), scape with a yellow patch beneath. Maxillary palp dark brown or black. Posterior part of propodeum black with a yellow stripe along posterior transverse carina. Hind coxa black, usually with a yellow dorsal patch. Hind femur black, yellow at extreme base, distally, and often dorsally. Segments of gaster each black anteriorly, yellow posteriorly.

Male. Width of lower face 1.00–1.20 times vertical length of eye. Malar space 0.60–0.90 times basal width of mandible. Maxillary palp as in Fig. 123; segment 4 flattened and slightly widened; segment 5 about 0.8 as long as 4. Antennal flag setae (Fig. 126) upright, moderately long, flattened, 2 per segment, arising from a polished trough. Hind femur 5.35–6.65 times as long as deep. Fore wing length 10.5–14.0 mm. Tergite 1 of gaster 1.65–1.90 times as long as broad. Tergite 3 with a crease along its anterior 0.4 separating laterotergite.

Colour: back and yellow. Antenna black, scape and pedicel (and sometimes flagellum segment 1 proximally) yellow ventrally, flagellum sometimes slightly brownish ventrally. Maxillary palp blackish or brownish. Posterior part of propodeum yellow anteriorly, black posteriorly, the yellow varying from a stripe along posterior transverse carina to covering almost entire area. Hind coxa black with a dorsal and often a postero-ventral yellow patch. Hind femur yellow, blackish laterally and ventrally towards base.



Map 11 Distribution of *Banchus zonatus*.

Segments of gaster each black anteriorly, yellow posteriorly, the yellow less variable in extent than in females, occupying about 0.5 of each tergite.

REMARKS. This is the largest species of the genus and the appearance of the females in particular is very striking. *B. zonatus* seems to be most closely related to *dilatatorius* and *moppiti*.

The specimens from the eastern Mediterranean (Cyprus and Israel) consistently have the scutellar spine very small or virtually absent and it is possible that they represent a separate species. However, this is difficult to investigate without additional material. There are no specimens from peninsular Italy, Greece or Turkey in collections.

BIOLOGY AND HOSTS. Unknown. Dates of collection range from early September to mid-December. There is a single male with a date in March, unfortunately without an intelligible locality but with the intriguing data 'Salix caprea'.

DISTRIBUTION (Map 11, p. 43). A 'Mediterranean' species. Meyer (1927b: 291) records the species from the Caucasus but I have seen no specimens to substantiate this north-eastward extension of its distribution.

MATERIAL EXAMINED (28 ♀, 21 ♂)

Algeria, Cyprus, France, Israel, Italy, Morocco, Spain, Tunisia (AC, BMNH, FSA, IEE, MHN, MNHN, MNHU, NR, TAU, TC, UZM).

Species excluded from *Banchus*

The following Old World species were described incorrectly in *Banchus*.

Banchus armillatus Morley, 1913: 254. Holotype ♂, NICOBAR ISLANDS (BMNH) [examined].

Identity. *Phytodietus armillatus* (Morley). In Kaur & Jonathan's (1979) treatment of Oriental *Phyto-*

dietus the holotype runs to *P. alasuffuscus* Kaur & Jonathan. However, it differs in some details, particularly in the degree of constriction of tergite 1 of the gaster.

Banchus elator Fabricius, 1804: 128. LECTOTYPE ♂, AUSTRIA (UZM), here designated (selected by G. E. J. Nixon) [examined].

Identity. *Earinus elator* (Fabricius) **comb. n.** (Braconidae) (see Nixon, 1986, in press).

Banchus histrio Fabricius, 1798: 234. Lectotype ♂, EAST GERMANY (UZM), designated by Horstmann, 1982b: 243 [not examined].

Identity. *Lissonota histrio* (Fabricius) (Horstmann, 1982b: 243).

Banchus quadrator Schellenberg, 1802: 21. Type(s) ♀, SWITZERLAND (lost).

Identity. *Megarhyssa quadrator* (Schellenberg) **comb. n.** Schellenberg's description and figures are obviously of a rhyssine (Pimplinae). The species concerned corresponds to that named as *M. citraria* (Olivier) in the BMNH collection. The two recent catalogues (Oehlke, 1967; Aubert, 1969) covering European *Megarhyssa* differ in so many details that it is not clear what name is the valid one for this species. Whatever it is, *quadrator* will be a junior synonym. Gravenhorst's invitation (1829: 959) to compare *quadrator* with *M. superba* (Schrank) has been overlooked by all who have dealt subsequently with the European Rhyssini.

Banchus robustus Rudow, 1883b: 246. Type(s) ♀, EAST GERMANY (?JPM) [not examined].

Identity. Unknown, it remains a nomen dubium. It is excluded from *Banchus* because of the length of the ovipositor: 'Legestachel fast halb so lang als Hinterlieb'.

Banchus spinipes Panzer, 1800: 17. Type(s) ♀, GERMANY (lost).

Identity. Junior synonym of *Cephus pygmeus* (Linnaeus) (Cephidae) (Muche, 1981: 283).

Banchus tomentosus Gravenhorst, 1829: 376, Holotype ♀, EAST GERMANY (ZI) [examined].

Identity. *Exetastes tomentosus* (Gravenhorst) (Townes, Momoi & Townes, 1965: 235).

Banchus villosulus Gravenhorst, 1807: 267. Syntypes [?number] [?♀], no type-locality (lost).

Identity. The description of this species fits a cynipoid rather than an ichneumonid. Gravenhorst himself compared it to *Ibalia* and did not refer to it in any of his subsequent works on ichneumonids. It is unlikely that any type-material will be found. The general nature of the description makes application of the name to a particular species difficult, but it is desirable to formally transfer the name to the Cynipoidea so that workers on that group can consider its identity. The species is here placed as a nomen dubium in *Andricus* (**comb. n.**) (Cynipidae), to the agamic females of which the description seems best to apply.

Banchus viridator Fabricius, 1804: 127. Syntypes ♀, AUSTRIA (UZM) [one of four putative syntypes examined].

Fabricius cited *Banchus spinipes* Panzer as a synonym of his new species *viridator*. I can see no reason for him not to have used Panzer's name for the species. Whatever the reasons, it complicates consideration of the name. It could be treated as an independent species, as published in synonymy, or as a replacement name (in which case the type-specimens would be those of *B. spinipes* rather than those cited above).

Identity. Junior synonym of *Cephus pygmeus* (Linnaeus) (Cephidae) (Muche, 1981: 283).

The following species have been placed incorrectly in *Banchus* at some time.

Ichneumon annulatus Fabricius, 1793 is a pompilid, *Pompilus (Epsyron) annulatus* (Fabricius) (Schulz, 1912: 73).

Ichneumon cultellator Fabricius, 1793 is a junior synonym of *Ibalia leucospoides* (Hochenwarth) (Ibalidae) (Kerrich, 1973: 73).

Ichneumon fornicator Fabricius, 1781 is a species of *Exetastes* (Townes, Momoi & Townes, 1965: 229).

Ichneumon gravidator Linnaeus, 1758 is a species of *Proctotrupes* (Proctotrupidae) (Fitton, 1978b: 378; Townes & Townes, 1981: 179).

Ichneumon varius Fabricius, 1793 is a junior synonym of *Theronia atalantae* Poda (Aubert, 1978: 167).

Ichneumon vigilatorius Panzer, 1804 was synonymised with *Banchus falcatorius* by Gravenhorst (1829: 390). This was later rejected in favour of synonymy with *compressus* (Aubert, 1978: 153) but was reinstated by Horstmann (1982b: 238). However, Schaeffer's illustration (1767: pl. 61, fig. 6), to which Panzer's description and name refer, clearly shows an ichneumonid with segment 1 of the gaster strongly petiolate and which probably belongs in the Ichneumoninae. Although I cannot find an ichneumonine with all

details of the colour pattern correct, I think it best to place the species as a nomen dubium in *Ichneumon* (comb. rev.).

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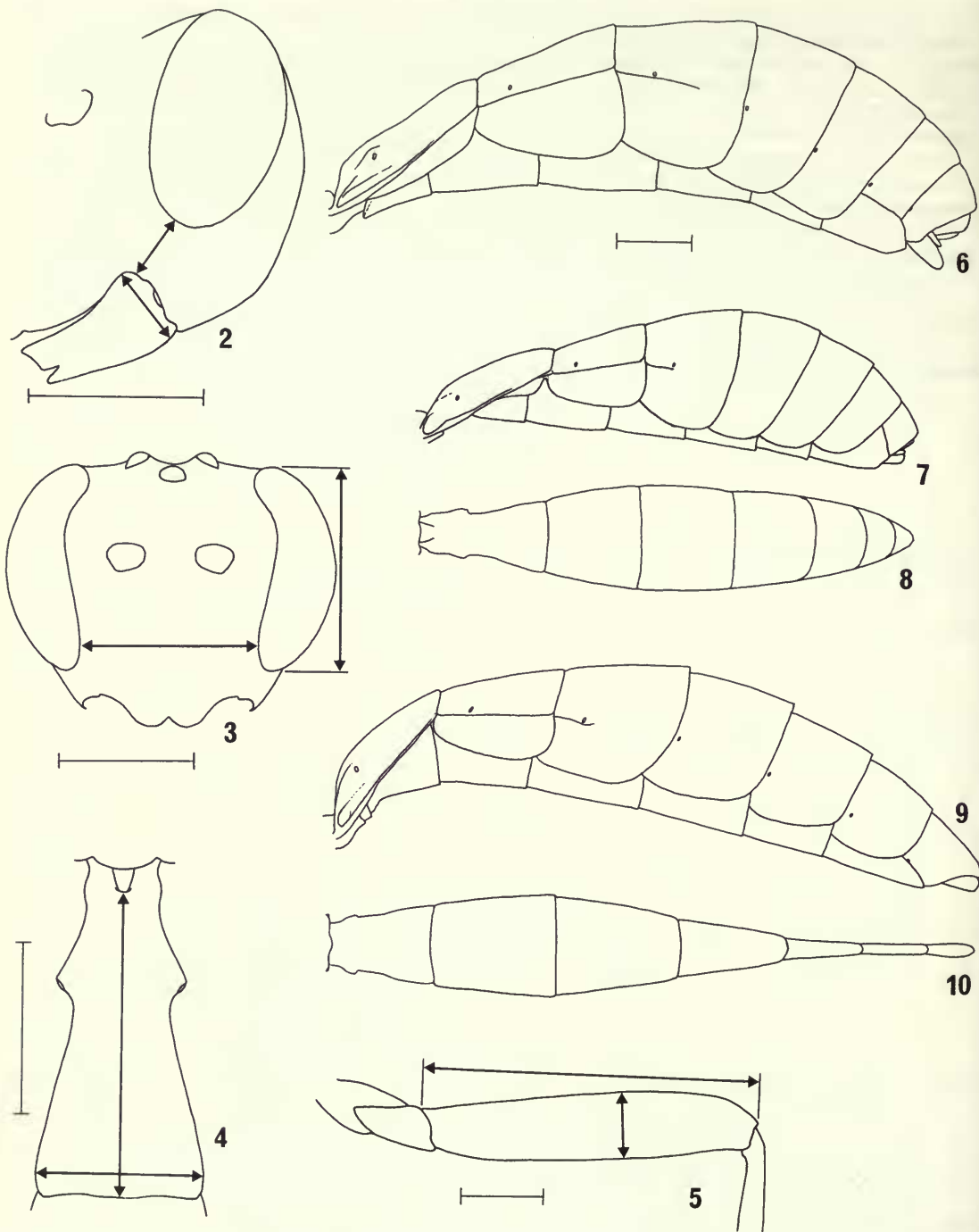
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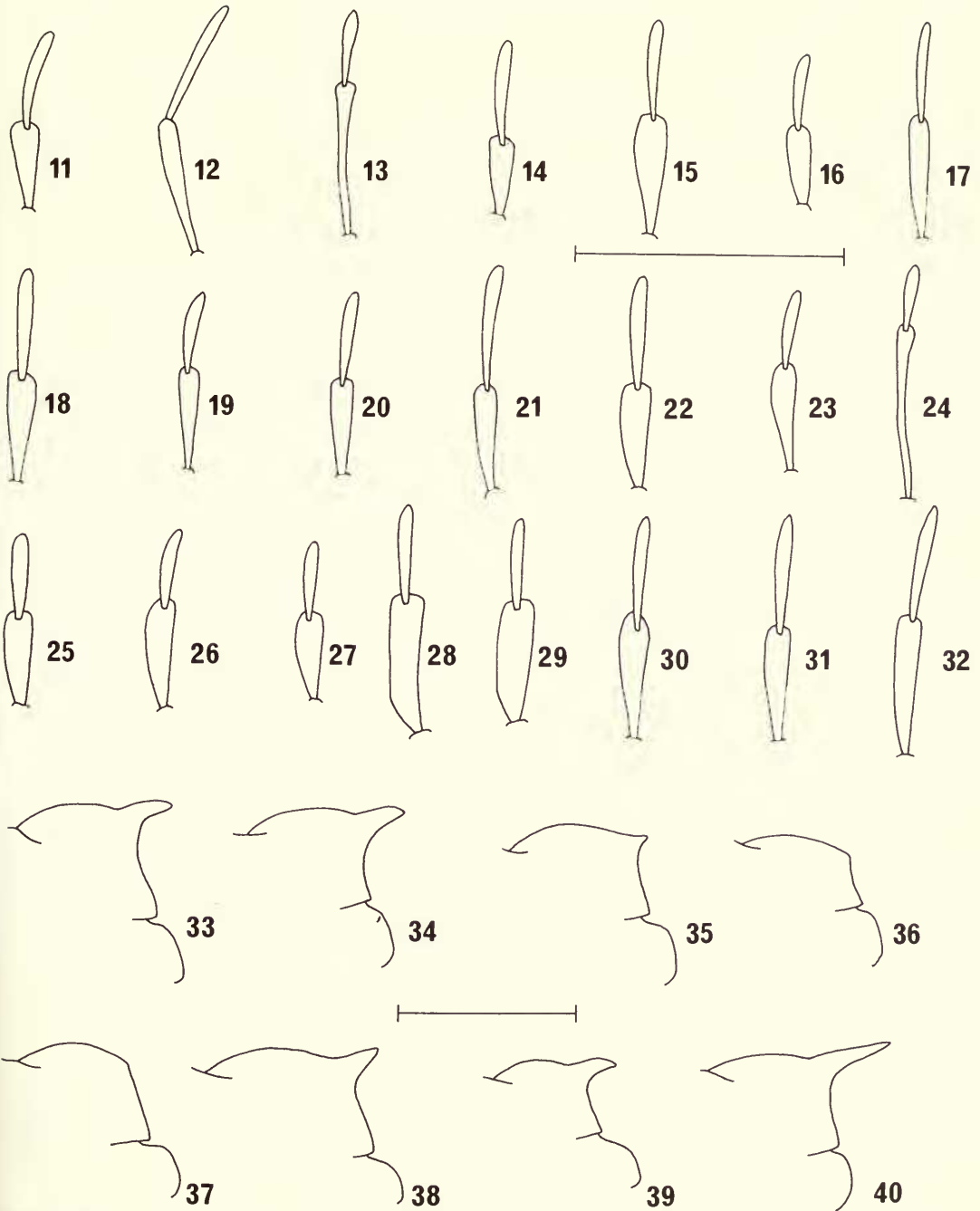
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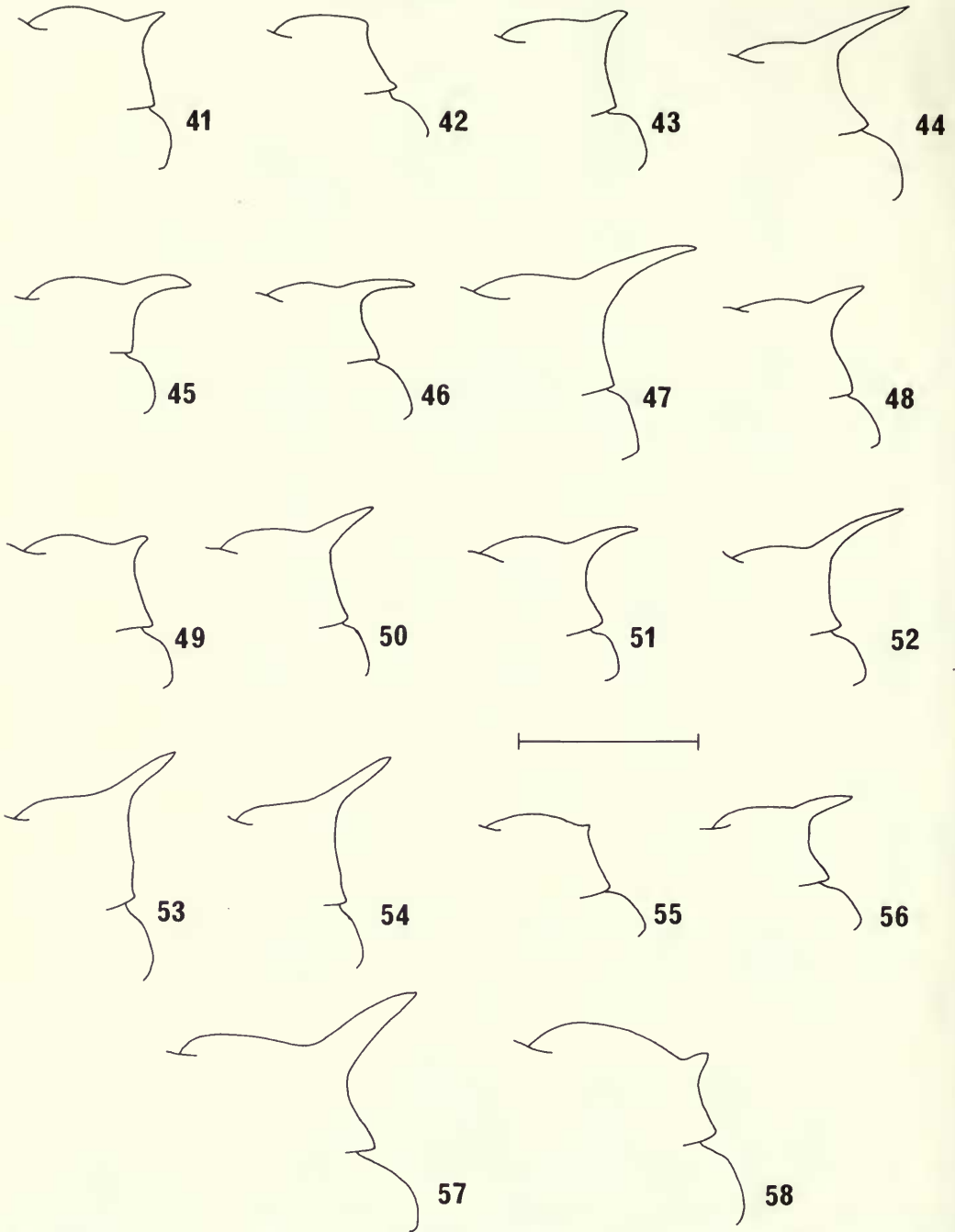
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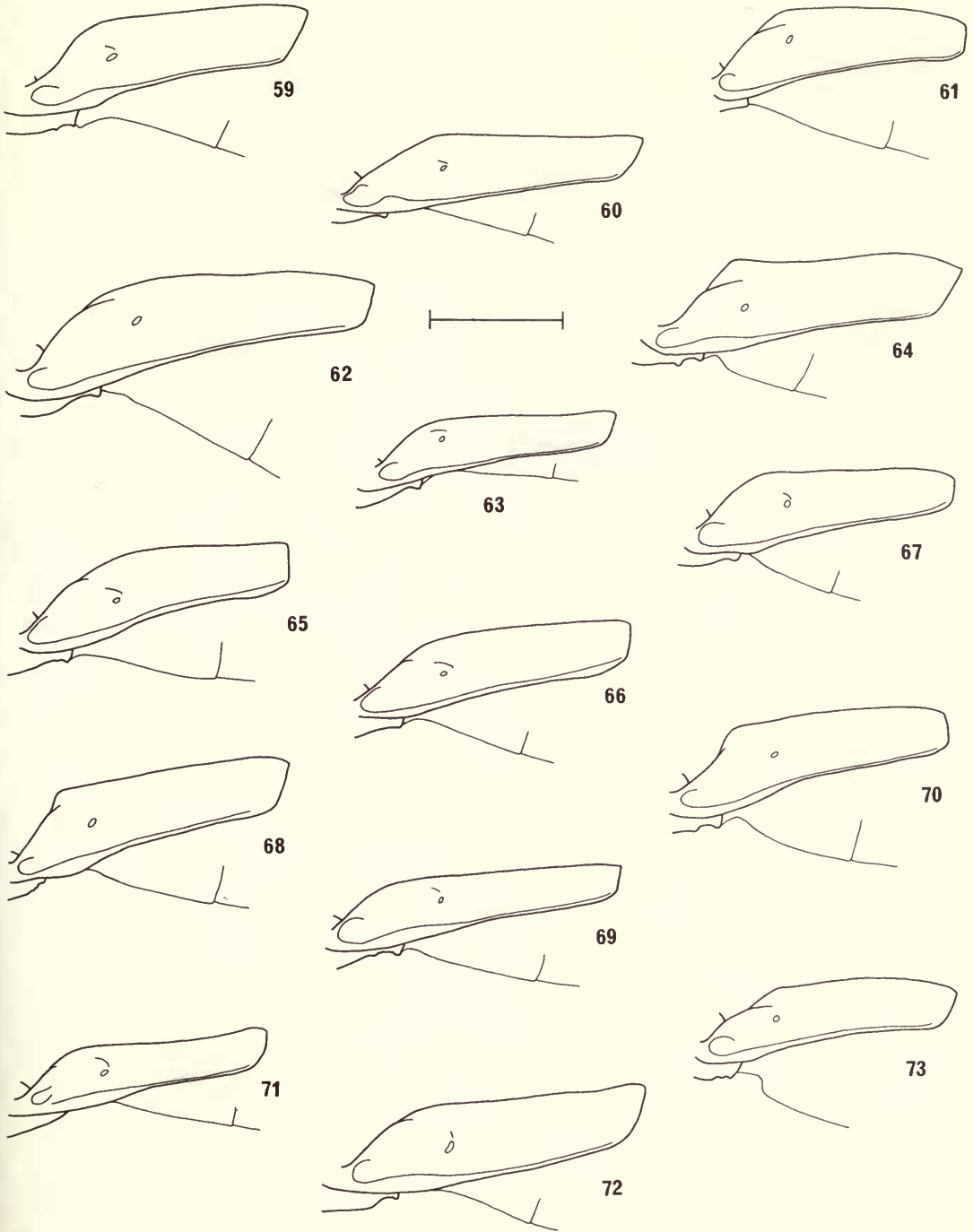
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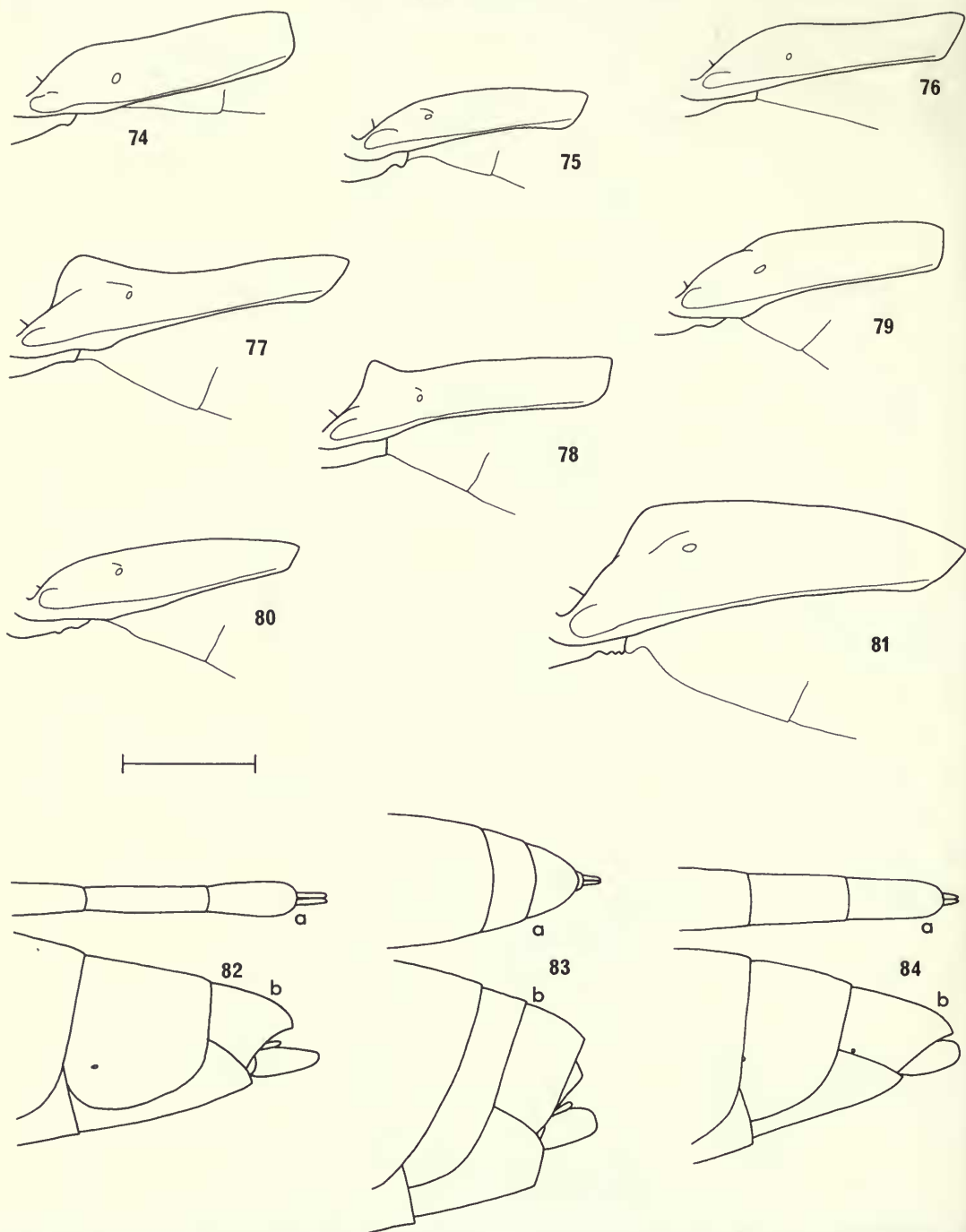
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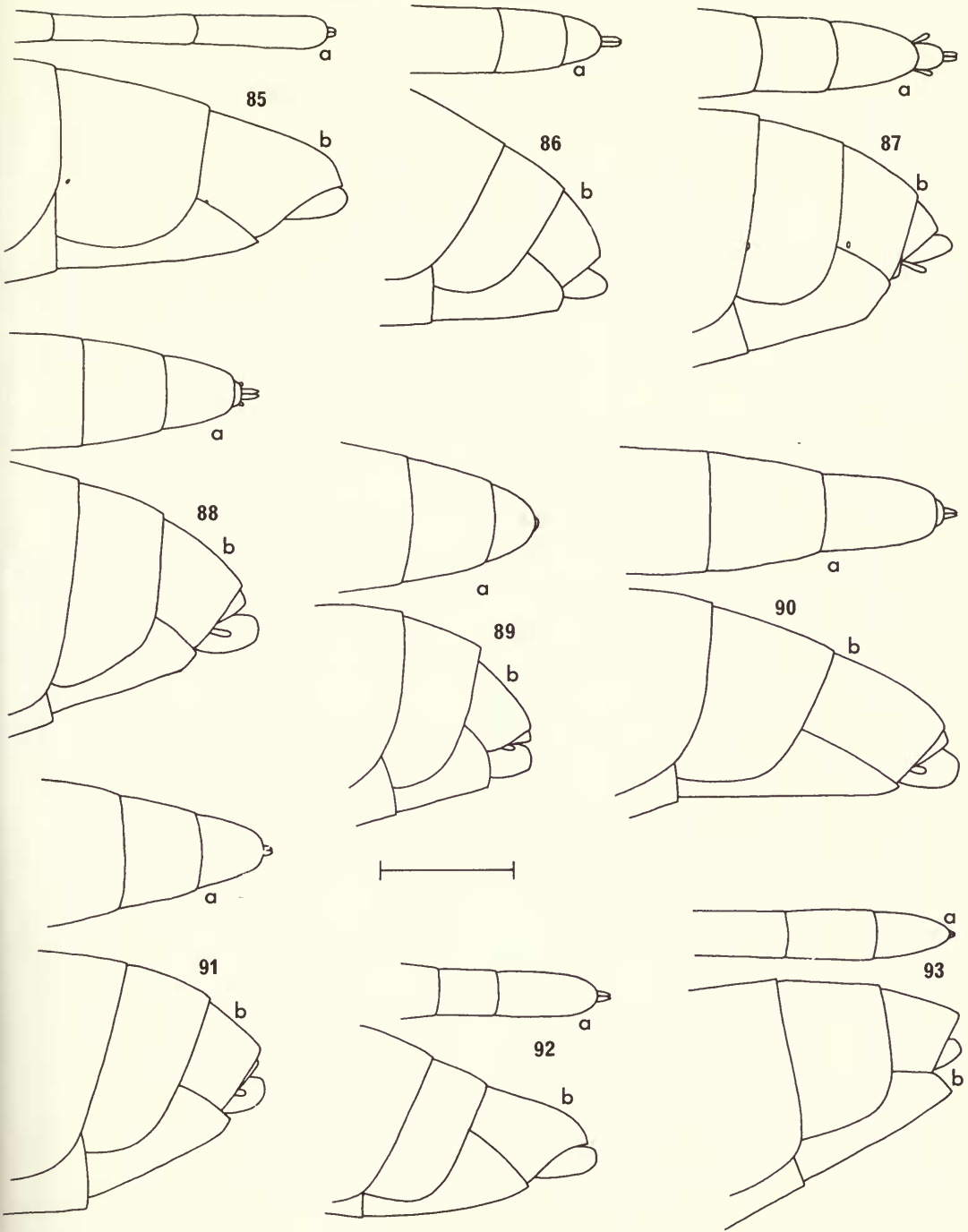
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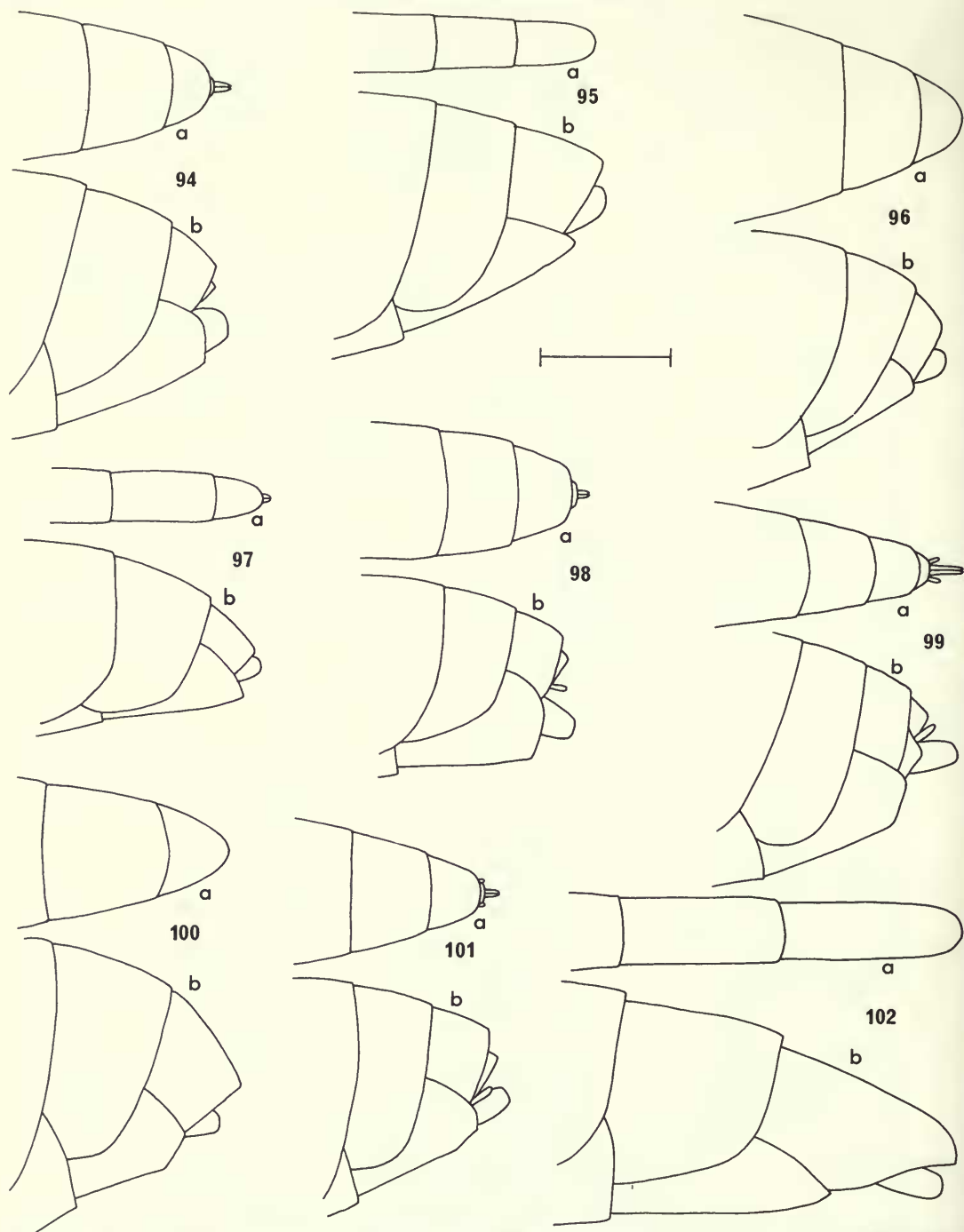
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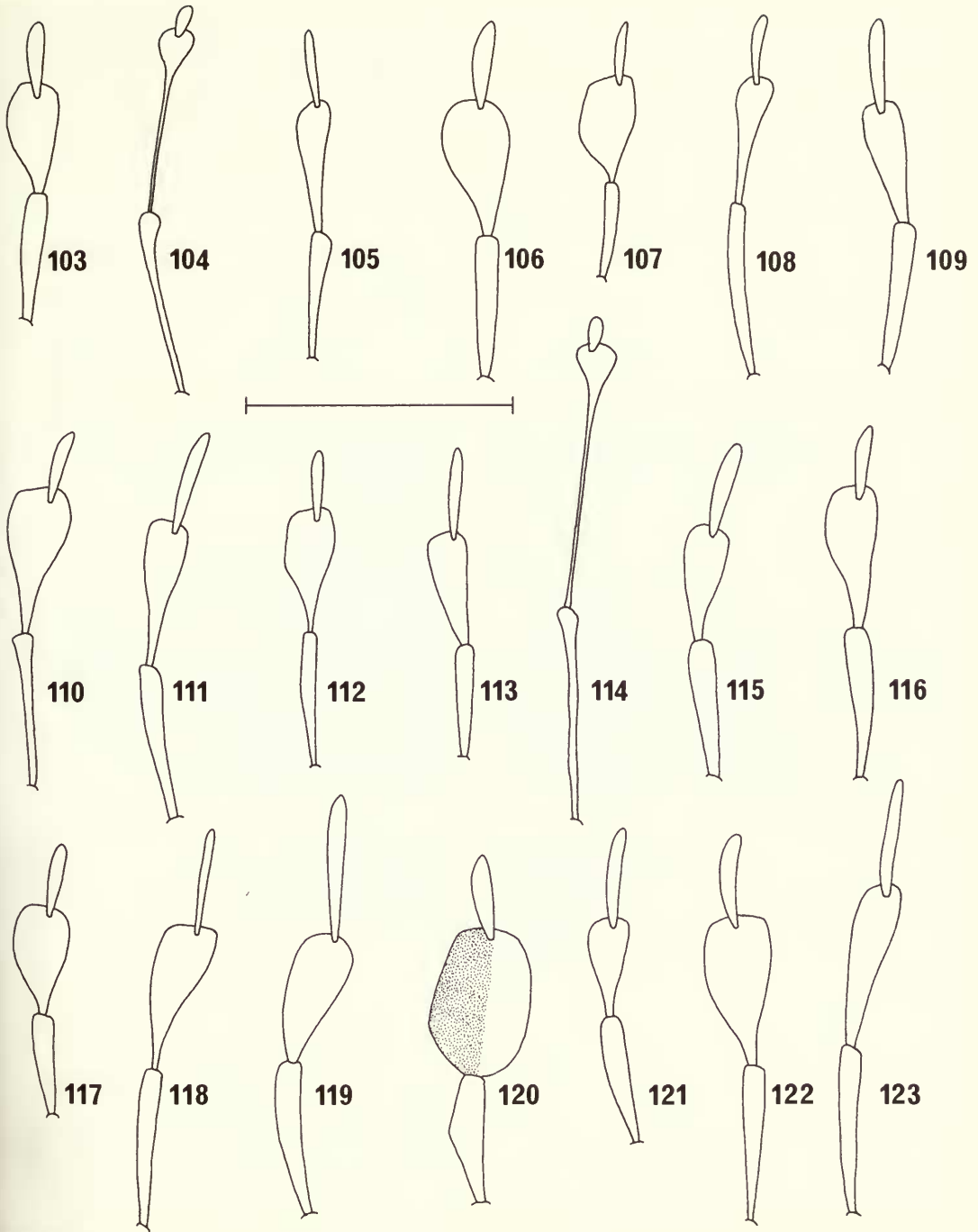
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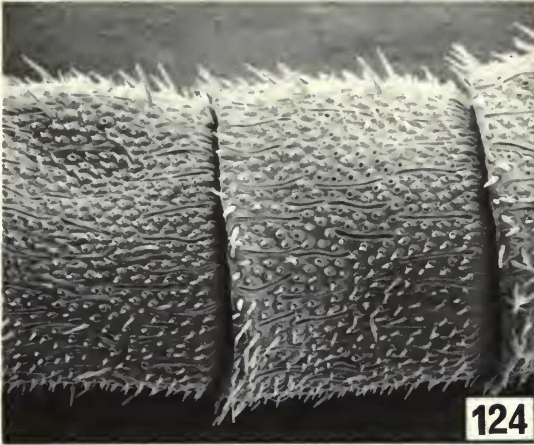
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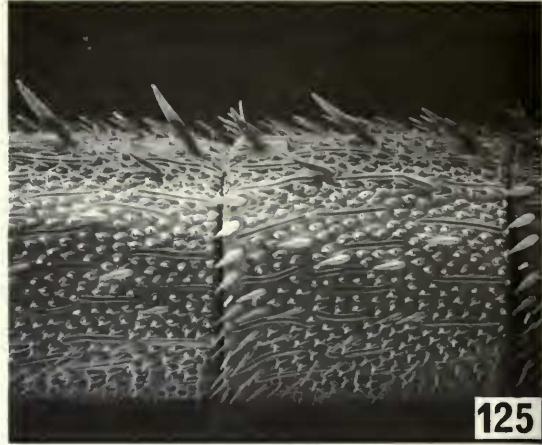
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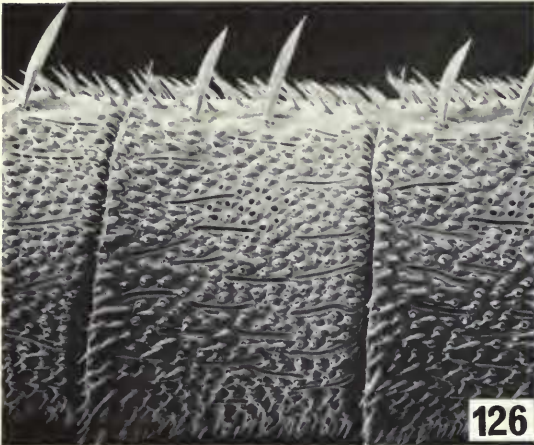
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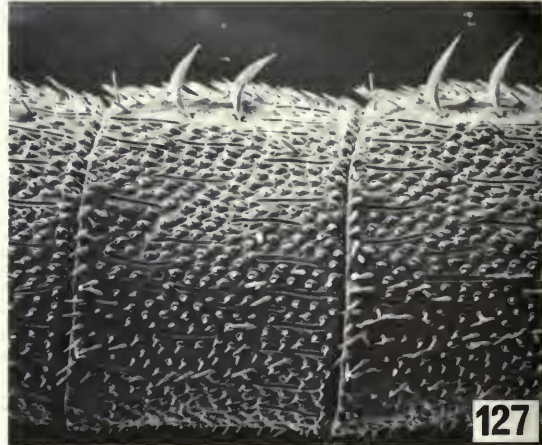
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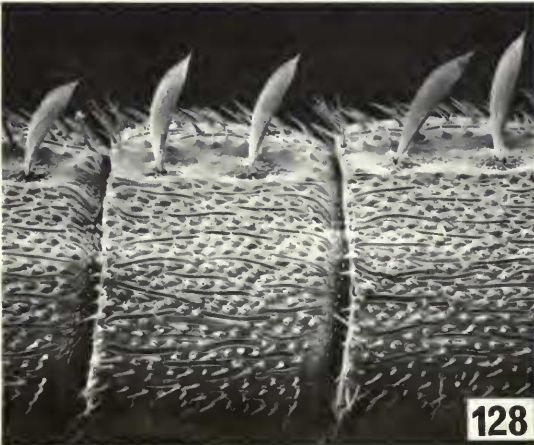
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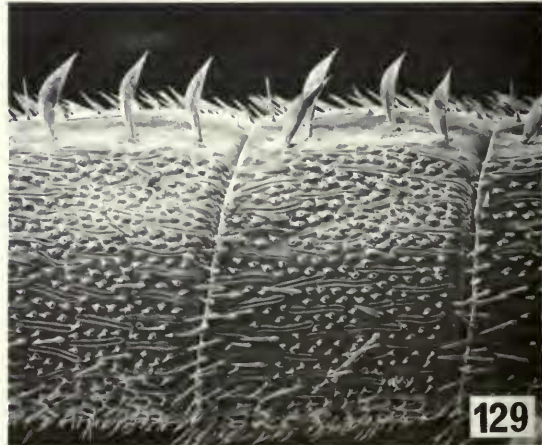
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